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ABSTRACT

This instructional guide contains guidelines and course outlines for a two- and three-year course in agricultural science and mechanics for students in grades 8, 9, and 10. Provided in the first 4 sections are course outlines for Agricultural Science and Mechanics I and II and references for use in each course. Each course outline contains an analysis Grade 8; Grade 9; Grade 10; Course Descriptions; Instructional Materials; mechanics, principles of soil science, principles of plant science, rural and urban living, leadership training, and resource conservation). Topics covered in the individual analyses include unit concepts, suggested student performance objectives, examples of student learning activities, competencies, career guidance, and exploring opportunities on on- and off-farm agricultural occupations. The remaining five sections of the guide present suggested instructional materials and references for the course outline, recommended facility plans, lists of recommended equipment and tools, criteria for quality vocational programs in agricultural education, and a list of agricultural education publications. (MN)

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# Agricultural Science and Mechanics I and II

**An Instructional Guide for Agricultural Education**

Prepared by

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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# PREFACE

Agricultural education in the public secondary schools of Virginia is a broad-based elective program of instruction designed to meet the increasingly complex educational needs of those who will seek employment in the industry of agriculture.

The program includes education for prospective farmers and also for those who will be employed in off-farm occupations involving a knowledge of agricultural subjects.

The major objective of vocational education in agriculture in the public schools of the state has been expanded to help prepare students for on-farm and off-farm agricultural occupations, and to assist those who plan to continue agriculture education on the post high school or university levels.

The course in Agricultural Science and Mechanics I and II provides students with a basic background of knowledge and skills that serve as a prerequisite for advanced agricultural course options.

This publication is one in a series and is designed as a basic instructional guide for the first two years of instruction in agricultural education.

S. John Davis
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# INTRODUCTION

The first two years in the agricultural education curriculum are devoted to agricultural science and mechanics. During this period, basic principles of the sciences, mathematics, and economics are reviewed, studied, and applied to agricultural situations. These two years of study provide much of the knowledge and skills common to agricultural production and employment in off-farm agricultural industries and businesses.

Agricultural Science and Mechanics I and II is introductory and basic in nature. The agricultural science part of the course relates to both rural and urban life. The life sciences deal with origins, structures, and functions of living things and includes a study of the basic biological, earth, and social sciences.

Approximately half of the course in Agricultural Science and Mechanics I and II is alloted to agricultural mechanics and is designed to provide the student with instruction basic to occupations in which mechanical aptitudes, abilities, and skills are necessary. The students receive personal guidance and counseling which will help them select the advanced course leading to entry employment in an agricultural occupation.

The Future Farmers of America (FFA) organization is an integral part of agricultural education. The primary purposes of the organization are the development of leadership, citizenship, and cooperation. These purposes are well suited to meet the needs of all students enrolled in agricultural education.

The program covers the first two years in the agricultural education curriculum and is normally a prerequisite for entry into agricultural courses taught in the third, fourth, and fifth years. When Agricultural Science and Mechanics is started or introduced in the eighth grade, three years of study may be available in the option. If it is started in the ninth grade, only two years of additional study will be available. Time estimates in this publication are to be used as a guide only.

Julian M. Campbell, Associate Director
Agricultural Education

# OVERVIEW OF THE COURSE OUTLINE FOR AGRICULTURAL SCIENCE AND MECHANICS I AND II

## I. DEFINITION

Agricultural Science and Mechanics I and II is introductory and basic in nature and provides a background for success in agricultural occupations. Students develop basic skills and are provided guidance and counseling that will help them to select the advanced coursse option leading to entry employment in an agricultural occupation.

## II. PURPOSES

The primary purposes of the Agricultural Science and Mechanics I and II course of study are to:

A. provide students with a science background that deals with origins, structures, and functions of living things, and includes a basic study of earth, biological, and social sciences.
B. provide students with instruction basic to occupations in which mechanical aptitudes, abilities, and skills are necessary.
C. contribute to the fulfillment of the broad educational objectives set forth in the high school where this course is taught.

## III. OBJECTIVES

A. To develop a background for success in Agricultural Occupations.
B. To develop a knowledge of agricultural option opportunities.
C. To develop leadership, citizenship, and cooperation by making FFA an integral part of agricultural education.
D. To develop a knowledge of and plans for occupational experience.
E. To develop skills, safe working habits, and attitudes.

## IV. ENROLLMENT GUIDELINES FOR STUDENTS

The two year course in Agricultural Science and Mechanics I and II is designed for students in the 8th, 9th, and 10th grades. This course is considered to be a prerequisite for enrollment in the Agricultural Education options.

## V. OCCUPATIONAL EXPERIENCE PROGRAM

Each student is required to carry out a well planned and supervised occupational experience program as an integral part of the course expectations. Experiences may be provided in the school mechanics laboratory, on farms, in nearby farm businesses or through a combination of these sources.

## VI. HOURS OF INSTRUCTION

The total course of Agricultural Science and Mechanics I and II is designed for 360 hours of in-school instruction. Each year of the course needs 180 hours for completion with single periods per day allocated for class instruction.

## VII. ADVISORY GROUPS

Local advisory groups should be consulted relative to instruction in the various segments of the Agricultural Science and Mechanics curriculum.

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# AGRICULTURAL SCIENCE AND MECHANICS I

| Major Learning Areas | Time Estimate |
|---|---|
| I. AGRICULTURAL ORIENTATION | 5 days |
| II. SUPERVISED OCCUPATIONAL EXPERIENCE PROGRAM | 15 days |
| III. AGRICULTURAL MECHANICS (90) | |
| A. Providing Orientation | 5 days |
| B. Introducing Metals | 5 days |
| C. Fitting Tools | 8 days |
| D. Working Cold Metals | 7 days |
| E. Introducing Arc Welding and Gas Welding | 15 days |
| F. Fabricating Metal and Gas Welding (Sheet Metal-Soldering-Brazing) | 15 days |
| G. Reading Plans and Sketching | 10 days |
| H. Woodworking Using Hand Tools | 15 days |
| I. Operating Hazardous Farm Equipment Safely | 5 days |
| J. Using Concrete | 5 days |
| IV. PRINCIPLES OF SOIL SCIENCE | 10 days |
| V. PRINCIPLES OF PLANT SCIENCE | 25 days |
| VI. RURAL AND URBAN LIVING | 10 days |
| VII. LEADERSHIP TRAINING | 15 days |
| VIII. RESOURCE CONSERVATION | 10 days |
| TOTAL | 180 days |

# AGRICULTURAL SCIENCE AND MECHANICS I
# ANALYSIS OF MAJOR LEARNING AREAS

## I. AGRICULTURAL ORIENTATION (5)

UNIT CONCEPT: Agricultural Science and Mechanics is basic in nature, and provides a background for success in agricultural occupations. By studying the various occupations, the student will be able to consider points that may influence the choice of a career.

SUGGESTED STUDENT PERFORMANCE OBJECTIVES

1. Upon completion of this unit, students will correctly identify fifteen agricultural occupations.
2. Given a specific agricultural career in which the student is interested, the student will determine with 100% accuracy, the competencies and requirements needed for entry and advancement in that career.

EXAMPLES OF STUDENT LEARNING ACTIVITIES

1. Each student will complete a personal inventory
2. Class tour of one or more production agricultural enterprises
3. Conduct a survey of opportunities in off-farm agricultural occupations

COMPETENCIES

1. Identifying strong (weak) personal characteristics
2. Identifying opportunities in production agriculture available in the school service area
3. Listing skills needed for success in off-farm agricultural occupations

A. Providing Career Guidance

1. Personal traits necessary for success in any occupation
2. Points to consider in selecting an occupation
3. Desirable traits in an employee
4. Opportunities for advancement
5. Qualities needed for success in farming
6. Resources needed to begin farming
7. Qualities needed for success in off-farm agricultural occupations
8. Training needed for off-farm agricultural occupations

B. Exploring Opportunities In Agricultural Production
   1. Livestock production
   2. Crop production
   3. Horticultural production
   4. Forestry
   5. Other opportunities in agricultural production

C. Exploring Opportunities In Off-Farm Agricultural Occupations
   1. Manufacture of agricultural products
   2. Distribution of agricultural products
   3. Farm service
   4. Food processing and packaging
   5. Sales and service
   6. Other opportunities in off-farm agricultural occupations

## II. SUPERVISED OCCUPATIONAL EXPERIENCE PROGRAMS (SOEP) (15)

UNIT CONCEPT: The occupational experience program provides each student the opportunity to apply what has been learned in the classroom and laboratory. Given this system, all students should plan and conduct, under the supervision of their instructor, a program of application experiences, commensurate with their instruction, personal interest, and community resources. Upon program completion, experience gained in conducting a SOEP should lead to developing a saleable skill usable in an agricultural and / or a related industry.

SUGGESTED STUDENT PERFORMANCE OBJECTIVES

Upon completion of this unit students will:

1. select, plan, and execute an appropriate supervised occupational experience program
2. maintain accurate supervised occupational experience program records

EXAMPLES OF STUDENT LEARNING ACTIVITIES

1. Class visit to study the supervised occupational experience program of an advanced agricultural student
2. Review three appropriate program agreements
3. Keep a practice set of records on two SOEP projects

COMPETENCIES

1. Selecting appropriate supervised occupational experience program
2. Developing and executing an agreement for the program selected
3. Maintaining SOE program records

A. Planning Experience Programs
   1. Selecting supervised experience activities in such areas as:
      a. Homestead improvement
      b. Livestock
      c. Crops
      d. Horticulture
      e. Soil and water management
      f. Mechanics
      g. Forestry
      h. Agricultural business

B. Executing Program Agreements
   1. Arranging agreements with parents
   2. Arranging rental agreements
   3. Arranging work agreements

C. Keeping Records

## III. AGRICULTURAL MECHANICS (90)

UNIT CONCEPT: Approximately one half of the course in Agricultural Science and Mechanics is alloted to agricultural mechanics and is designed to provide the student with instruction basic to occupations in which mechanical aptitudes, abilities, and skills are necessary. This instruction is a prerequisite for entry into options taught in the third, fourth and fifth years.

SUGGESTED STUDENT PERFORMANCE OBJECTIVES

1. Given the major power equipment and tools in the agriculture mechanics laboratory, students will identify them with 100% accuracy.
2. Given metal and welding equipment, students will heat treat and fabricate metal for agricultural usage following appropriate standards.
3. Given the necessary ingredients, students will calculate mix and pour concrete for a splash block according to the instructor's standards.

4. Given appropriate instruction, students will secure certification and safely operate hazardous farm equipment.
5. Given ten samples of woods commonly found in Virginia, students will identify eight with 100% accuracy.
6. Given ten boards of lumber, students will calculate board feet with 100% accuracy.
7. Given hand woodworking tools, students will construct a nailbox according to the instructor's standards.
8. Given common hand tools, students will sharpen and fit according to the instructor's standards.

EXAMPLES OF STUDENT LEARNING ACTIVITIES

1. Class tour of agricultural mechanics laboratory
2. Study metals and learn their properties
3. Make a tool sharpening template
4. Complete cross word puzzle on arc welding terms
5. Clean and tin soldering devices
6. Review an accurate plan of an agricultural project
7. Collect samples of eight different kinds of wood (4″ × 6″ × 1″)

COMPETENCIES

1. Identifying the major power equipment in the agricultural mechanics laboratory
2. Identifying metal
3. Heat treating and fabricating metal for agricultural usage
4. Sharpening and maintaining agricultural mechanics laboratory tools
5. Identifying and using hand woodworking tools
6. Identifying arc welding equipment and tools
7. Selecting the correct electrode for specific welding applications
8. Selecting the correct soldering flux for soldering
9. Identifying common Virginia woods
10. Cutting threads and fitting cold metals
11. Selecting lumber to construct woodworking projects
12. Selecting and using wood fasteners
13. Calculating board feet of lumber
14. Calculating mix and pouring concrete
15. Mixing mortar and laying masonry blocks
16. Securing certification and safely operating hazardous farm equipment

A. Providing Orientation (5)

1. Purposes and values of mechanics education
2. Organization, procedures, housekeeping activities, general safety rules, and tool layouts
3. Study school's agricultural mechanics laboratory layout
4. Discussion of agricultural mechanics in all options as they apply to the local situation

B. Introducing Metals (5)

1. Chemical composition
2. Kinds
   a. Ferrous
      (1) Iron ore
      (2) Pig iron
      (3) Steel: low, medium, and high carbons
      (4) Wrought iron
      (5) Cast iron
      (6) Stainless steel
      (7) Alloys (steel)
   b. Non-Ferrous
      (1) Lead
      (2) Aluminum
      (3) Copper
      (4) Magnesium
      (5) Nickel
      (6) Silver
      (7) Brass
      (8) Others
3. Physical Properties
   a. Grain structure
   b. Hardness
   c. Strength
   d. Magnetism
   e. Ductile
   f. Lustre
   g. Malleable
   h. High specific gravity
   i. Conductors of heat and electricity
4. Chemical properties
5. Using safety practices
6. Identification
   a. Spark test
   b. Chip test
   c. Magnetic test
   d. Specific gravity
   e. Acid test
   f. By use and by color
7. Heat treating and hot metals
   a. Sources of heat for heat treating
      (1) Electric furnace
      (2) Gas furnace
      (3) Acetylene torch
   b. Hardening and annealing
   c. Tempering

d. Bending and shaping

8. Students will practice and complete an approved project

C. Fitting Tools (8)

1. Plan reading
2. Using safety practices
3. Identifying and selecting tools, equipment, and supplies
4. Relationships of angles to cutting edge tools
   a. Measurement of angles on cutting edge tools
   b. Functions of different sized angles
   c. Use of a template
5. Cleaning tools
   a. Pumice and water
   b. Rust remover or other abrasives
6. Dressing a grinding wheel
7. Use of grinder
8. Sharpening hand tools
   a. Acquire the proper angle
   b. Sharpen without softening the metal
9. Fitting hand tools
10. Complete required tool fitting projects

D. Cold Metals (7)

1. Plan reading
2. Using safety practices
3. Identifying and selecting tools, equipment, and supplies
4. Using tools and equipment
   a. Hand hacksaw
   b. Power hacksaw
   c. Metal cutting bandsaw
   d. Abrasive cut-off wheel
   e. Files
   f. Bolt cutter
   g. Shears
   h. Other
5. Cutting Threads
6. Students will practice and complete an approved project such as a bending jig or drawbar pin

E. Introducing Arc Welding (15)

1. Plan reading
2. Using safety practices
3. Identifying and selecting tools, equipment, and supplies
   a. Welders
   b. Accessories

c. Protective equipment
d. Supplies

4. Understanding welding terms
5. Installing and maintaining an arc welder
6. Understanding principle of operation
   a. Voltage
   b. Amperage
   c. A.C. transformer welder (Use amprobe to facilitate understanding.)
7. Identifying and selecting electrodes
   a. Mild steel
   b. Low alloy
   c. Cast iron
   d. Hardsurfacing
8. Cleaning metal
9. Operating the welder
   a. Selecting proper amperage
   b. Making quality starts, stops, and restarts
   c. Establishing and maintaining correct arc length
   d. Holding the electrode at proper angle
   e. Using the electrode holder properly
   f. Using the correct electrode movement and speed of travel
   g. Controlling heat of the pad
   h. Making general observation while welding
10. Practice and required project

F. Fabricating Metal and Gas Welding (Sheet Metal, Soldering, and Brazing (15)

1. Plan reading
2. Using safety practices
3. Identifying and selecting tools, equipment, and supplies
4. Types of sheet metal
5. Understanding the purpose of fluxes
6. Soldering fluxes
   a. Chloride or "acid" type
   b. Organic types
7. Solders
   a. Soft
   b. Hard
8. Selecting the source of heat
   a. Electric soldering copper
   b. Propane cylinder

c. Acetyle[illegible] torch
d. Carbon a[illegible] torch
e. Others

9. Cleaning and [illegible]ing a soldering copper
10. Using propane [illegible]nder
    a. Solder galvanized sheet metal patches
    b. Solder copper pipe and fitting
    c. Solder stranded copper wire using rosin core solder
11. Using electric soldering copper, perform the following exercises:
    a. Solder galvanized sheet metal patches
    b. Solder stranded copper wire
12. Practice and complete metal fabrication project

G. Reading Plans and Sketching (10)
1. Understanding the importance of plan reading
2. Identify and select drawing equipment and supplies
3. Basic procedures for mechanical drawing
    a. Lettering
    b. Lines
    c. Symbols
    d. Views of objects
4. Freehand sketching
5. Scale drawing
6. Reading and interpreting plans
7. Draw shop project plan

H. Woodworking Using Hand Tools (15)
1. Plan reading
2. Basic information on wood
    a. Chemical composition
3. Kinds of wood
    a. Hardwood
    b. Softwood
4. Selecting lumber and wood fasteners
    a. Grades of lumber
    b. Types of curing
    c. Plywood
        (1) Interior
        (2) Exterior
        (3) Special use

d. Wood fastener
(1) Nails
(2) Screws
(3) Glues
(a) Animal (c) Resin
(b) Cosein (d) Other

5. Calculating board feet
6. Using safety practices
7. Identifying & selecting handtools
8. Students will practice and construct an approved project such as the nailbox, using handtools and involving these skills:
a. Figuring bill of materials h. Setting screws
b. Measuring and marking i. Planning
c. Sawing j. Nailing
d. Chiseling k. Glueing
e. Rasping l. Sanding
f. Drilling m. Joining
g. Countersinking

I. Operating Hazardous Farm Equipment Safely (5)

J. Using Concrete (5)
1. Students will practice and construct an approved project involving skills in using concrete
a. Splash block
b. Feeding bowl
c. Parking bumper
2. Masonry skills
a. Barbecue pit
b. Masonry block wall
c. Planter
d. Mix mortar

## IV. PRINCIPLES OF SOIL SCIENCE (10)

UNIT CONCEPT: Conserving our natural resources relates to both rural and urban life. Understanding soil characteristics and applying appropriate management practices will help the student to conserve and renew a natural resource that is essential to life itself.

SUGGESTED STUDENT PERFORMANCE OBJECTIVES

1. Given soil test results, students will determine fertilizer needed to produce 110 bushels of corn per acre with 100% accuracy.
2. Given five soil types common to the school service area, students will identify four with 100% accuracy.

EXAMPLES OF STUDENT LEARNING ACTIVITIES

1. Determining the soil's contribution to plant growth
2. Participate in a FFA soils judging contest

COMPETENCIES

1. Determining the fertilizer needs based on soil test
2. Identifying soil types common to the school service area

A. Characteristics Of Soils And Their Management
   1. Importance of soil
   2. How soil is formed
   3. Composition of soil
   4. What the soil contributes to plant growth
   5. Soil characteristics, physical and chemical
      a. Identification of series and type
   6. Life in the soil
   7. Fitting the crop to the soil
   8. Management needs (based on soil type)
   9. Soil type and crop to be grown
      a. Fertilization
         (1) Amount
         (2) Time
         (3) Method
         (4) Cost
   10. Taking soil samples

B. Practicing And Applying Principles Of Soil Science
   1. Secure or make a soil map
   2. Select the crops to be grown
   3. Use crop rotation plan
   4. Take a soil sample
   5. Participate in soil judging school (contest)

## V. PRINCIPLES OF PLANT SCIENCE (25)

UNIT CONCEPT: A basic understanding of the principles of plant science helps to provide the student with a background for success in agricultural occupations. How plants grow and reproduce helps to establish a basis for seed bed preparation, cultivation and fertilization of crops.

SUGGESTED STUDENT PERFORMANCE OBJECTIVES

1. Given seed and cuttings, students will propagate plants using three appropriate methods with 80% livability.
2. Given cost and return data, students will balance nutrient requirements for maximum profit on an acre of tobacco with 100% accuracy.
3. Given an acre of land, students will manage cover crop, prepare seedbed and cultivate a crop of corn according to the instructor's standards.

EXAMPLES OF STUDENT LEARNING ACTIVITIES

1. Propagate tomatoes from seed
2. Determine the optimum environmental requirements for plant growth
3. List the factors that influence seed germination

COMPETENCIES

1. Preparing a seedbed for a selected crop
2. Propagating plants
3. Managing crop cover and plant residues
4. Selecting and operating cultivation equipment
5. Balancing nutrient requirements to obtain the maximum net profit from crop to be grown

A. Understanding How Plants Grow and Reproduce

1. Propagating plants
   a. Seed
   b. Buddings
   c. Cuttings
   d. Others
2. The requirements of germination
3. Nutrient requirements of a growing plant
4. The effect of environment on plant growth

5. Students practice and application
   a. Propagate plants
   b. Germinate seed

B. Determining Nutrient Requirements and Fertilizing Crops
   1. Commercial fertilizers
      a. Ingredients and sources
      b. Analysis
   2. Plant food requirements
      a. Functions of nitrogen, phosphorus, potassium, etc.
      b. Deficiencies
      c. Balance
   3. Cover and crop residue
   4. Farm manures
   5. Fertilizing
      a. Most profitable rate
         (1) Crop to be grown
         (2) Type of soil
         (3) Expected yield
         (4) Fertility level
         (5) Capital available
   6. Liming
      a. Types
         (1) Dolomitic
         (2) Calcitic
      b. Kinds
         (1) Burnt
         (2) Ground, etc.
      c. Sources
      d. Influence on growth
         (1) pH
         (2) Plant growth
         (3) Availability of other elements
      e. Amounts to use
         (1) Type of soil
         (2) Kind of lime
         (3) Crop to be grown
      f. Application
         (1) Time
         (2) Method

7. Students Practice and Application
   a. Secure and interpret results of soil test
   b. Determine the amount of plant food required to obtain yield
   c. Determine the amount and analysis to buy
   d. Procure plant food
   e. Select method of application
   f. Apply plant food

C. Preparing Seedbed
   1. Requirements of a good seedbed
   2. Methods of seedbed preparation
      a. Conventional
      b. Reduced tillage
      c. No tillage
   3. Selecting proper implements
   4. Preparing seedbed for various crops
      a. Time
      b. Type of soil
   5. Student practice and application
      a. Select the type of seedbed preparation
      b. Select the time
      c. Select implements
      d. Prepare seedbed for a specific crop

D. Cultivating Crops
   1. Reasons for cultivation
      a. Weed control
      b. Soil aeration
      c. Moisture preservation
   2. Factors which determine time and frequency of cultivation
      a. Condition of the soil
      b. Stage of plant growth
      c. Moisture condition
      d. Presence of weeds
   3. Types of cultivating equipment
      a. Rotary Hoe
      b. Cultivator
      c. Harrow
      d. Others

4. Providing equipment
   a. Purchase
   b. Rent
   c. Custom hire
5. Using equipment
   a. Adjusting
      (1) For depth
      (2) For distance from row or plants
6. Student practice and application:
   a. Selecting time and frequency to cultivate
   b. Select equipment
   c. Procure equipment
   d. Adjust equipment
   e. Cultivate
   f. Clean and store equipment

## VI. RURAL AND URBAN LIVING (10)

UNIT CONCEPT: A home vegetable garden can improve the quality of living and give many hours of personal satisfaction to rural and urban students and their families. Improving and maintaining the home will increase its value, make it more attractive, and increase the energy efficiency.

### SUGGESTED STUDENT PERFORMANCE OBJECTIVES

1. Given land, seed, equipment, etc., students will plan and grow a vegetable garden according to the instructor's standards.
2. Given a floorplan, students will develop a plan to insulate a home for energy efficiency according to the instructor's standards.
3. Using their own home as an example, students will list five advantages of improving and maintaining the home.

### EXAMPLES OF STUDENT LEARNING ACTIVITIES

1. Plan a home vegetable garden to be planted on a 50′ × 100′ plot
2. Plant a vegetable garden
3. Prune shrubs on home lawn
4. Make minor home repairs
5. Winterize home for energy efficiency

### COMPETENCIES

1. Planning, planting, and maintaining a vegetable garden
2. Performing minor home repairs
3. Winterizing the home

A. Developing A Home Vegetable Garden Plan

B. Planning And Growing The Home Vegetable Garden
   1. Determining needs and values
   2. Selecting soil and location
   3. Selecting crops, varieties, seeds, and plants
   4. Fertilizing
   5. Preparing the seedbed
   6. Planting
   7. Controlling insects and diseases
   8. Cultivating, mulching, and watering
   9. Harvesting

C. Improving And Maintaining The Home
   1. Developing an appreciation for attractive home and surroundings
   2. Importance of regular maintenance
   3. Efficient heating and cooling
   4. Importance of sufficient lighting
   5. Making minor repairs

## VII. LEADERSHIP TRAINING I

(Leadership development through instruction in group and individual activities.)
20 days

UNIT CONCEPT: Active participation in the FFA will provide the student opportunities for developing competencies in such areas as leadership, cooperation, citizenship, scholarship, and supervised agricultural occupational experience.

SUGGESTED STUDENT PERFORMANCE OBJECTIVES

1. Given classroom instruction, students will correctly define six essential traits of leadership.
2. Given appropriate instruction, students will correctly list five opportunities for leadership.
3. Given classroom instruction, students will correctly give the requirements for each FFA degree.
4. Given instruction in parliamentary procedure, students will preside over a FFA business session.

EXAMPLES OF STUDENT LEARNING ACTIVITIES

1. Participate in creed contest
2. Conduct a junior public speaking contest
3. Elect junior FFA officers
4. Participate in a "Building Our American Communities" (BOAC) project
5. Sell oranges to finance the FFA program of work

COMPETENCIES

1. Identifying essential traits of leadership
2. Identifying leadership principles
3. Identifying opportunities for leadership
4. Demonstrating parliamentary procedure skills

A. Defining A Leader

B. Developing An Understanding Of The Need For Leaders
   1. School
   2. Community
   3. State
   4. National
   5. International

C. Understanding Leadership Principles

D. Understanding The Essential Traits Of Leadership
   1. Integrity
   2. Knowledge
   3. Courage
   4. Decisiveness
   5. Dependability
   6. Initiative
   7. Tact
   8. Justice
   9. Enthusiasm
   10. Endurance
   11. Unselfishness
   12. Loyalty
   13. Judgment

E. Informing Students Of Opportunities For Leadership
   1. FFA
   2. Other school organizations
   3. Athletics
   4. Classroom and laboratory
   5. Church
   6. Home
   7. Community organizations

F. Developing An Understanding Of FFA
   1. History
   2. Purposes
   3. Development
   4. Ceremonies
   5. Degree requirements
   6. Program of work

G. Understanding And Practicing Parliamentary Procedure

1. Main motion

APPLICATION

1. Participation in FFA and other school activities
2. Participation in church activities
3. Participation in community activities

## VIII. RESOURCE CONSERVATION (10)

UNIT CONCEPT: It is important for the student to develop an appreciation for conservation and acquire an understanding of how conservation is related to nature and people.

SUGGESTED STUDENT PERFORMANCE OBJECTIVES

1. Given instruction in conservation, students will correctly list and explain the importance of four areas of conservation.
2. Given classroom instruction, students will develop an appropriate plan to prevent forest fires according to instructor's standards

EXAMPLES OF STUDENT LEARNING ACTIVITIES

1. Plant 100 white pine seedlings
2. Construct nesting boxes for water fowl
3. Establish ⅛ acre wildlife food patch
4. Investigate local game laws

COMPETENCIES

1. Conserving resources

A. Relating Conservation To Nature And People

1. Developing an appreciation for conservation
2. Conservation as it affects every day living
3. Area of conservation:
   a. Soil
   b. Water
   c. Air
   d. Wildlife
   e. Forests
4. Application
   a. Establish wildlife food patches
   b. Plant forest seedlings

## AGRICULTURAL SCIENCE AND MECHANICS I REFERENCES

I AGRICULTURAL

5, 20, 46, 59, 70, 73, 80

II SUPERVISED OCCUPATIONAL EXPERIENCE PROGRAM

9, 11, 24, 57

III AGRICULTURAL MECHANICS

2, 3, 7, 13, 15, 21, 22, 23, 27, 28, 29, 30, 32, 36, 37, 44, 47, 53, 54, 61, 62, 64, 66, 69, 76, 77, 88, 89, 91, 92, 94, 95, 96, 99

IV PRINCIPLES OF SOIL SCIENCE

10, 17, 65, 78, 82, 83, 84

V PRINCIPLES OF PLANT SCIENCE

10, 17, 35, 58, 59, 65, 78, 81, 82, 83, 84, 100

VI RURAL AND URBAN LIVING

2, 3, 45, 67, 69, 81, 85, 100

VII LEADERSHIP TRAINING

8, 25, 26, 34, 39, 63, 72

VIII RESOURCE CONSERVATION

4, 10, 17, 74, 82, 83, 84

(Refer to list of references in the back of this publication. The above numbers refer to the publication, author, and publisher in the list of references.)

## AGRICULTURAL SCIENCE AND MECHANICS II

| Major Learning Areas | Time Estimate |
|---|---|
| I. AGRICULTURAL ORIENTATION | 5 days |
| II. AGRICULTURAL MECHANICS (95) | |
| A. Understanding the Fundamentals of Electricity | 20 days |
| B. Welding with the Arc Welder | 20 days |
| C. Cutting and Welding with Gas | 5 days |
| D. Maintaining Small Gasoline Engines | 25 days |
| E. Woodworking Using Power | 15 days |
| F. Preserving Wood and Metal | 5 days |
| G. Operating Hazardous Farm Equipment Safely | 5 days |
| III. PRINCIPLES OF SOIL SCIENCE | 45 days |
| IV. RURAL AND URBAN LIVING | 10 days |
| V. LEADERSHIP TRAINING | 10 days |
| VI. RESOURCE CONSERVATION | 15 days |
| TOTAL | 180 days |

# AGRICULTURAL SCIENCE AND MECHANICS II
# ANALYSIS OF MAJOR LEARNING AREAS

## I. AGRICULTURAL ORIENTATION (5)

UNIT CONCEPT: Agricultural Science and Mechanics is basic in nature and provides a background for success in agricultural occupations. By understanding the types of off-farm agricultural occupations and analyzing the opportunities for employment and advancement, students can determine the appropriate option for a course of study in advanced agricultural education.

SUGGESTED STUDENT PERFORMANCE OBJECTIVES

Upon the completion of this unit, students will:

1. correctly identify twelve types of off-farm agricultural occupations.
2. analyze the opportunities for employment and advancement in three appropriate off-farm agricultural occupations.
3. choose a suitable option for course of study in advanced agricultural education.

EXAMPLES OF STUDENT LEARNING ACTIVITIES

1. Class tour of one or more different off-farm agricultural occupations
2. Make a list of the opportunities available in off-farm agricultural occupations in the school service area
3. Outline the advantages and disadvantages of five off-farm agricultural occupations

COMPETENCIES

1. Identifying types of off-farm agricultural occupations
2. Analyzing the opportunities for employment and advancement in off-farm agricultural occupations
3. Selecting the appropriate option for a course of study in advanced agricultural education

A. Understanding The Types Of Off-Farm Agricultural Occupations Such As:

1. Agricultural chemical manufacturers and distributors
2. Dairy products manufacturers and distributors
3. Crop processing, sales, and warehousing
4. Farm machinery retail sales and services
5. Farm supply and equipment retail stores

6. Feed manufacturers and wholesalers
7. Farm service
8. Flower production and sales
9. Food processing and distribution
10. Government agricultural services
11. Livestock sales and services
12. Lumber and wood products
13. Meat processing and wholesales
14. Nursery production, sales, and landscaping
15. Ornamental plant service
16. Pest control service
17. Poultry processing and sales
18. Others

Analyzing The Opportunities For Employment And Advancement In Off-Farm Agricultural Occupations

1. Agricultural firms and services—local, state, national
2. Advantages and disadvantages of various occupations
3. Training and experience desirable for success in off-farm occupations
4. Personal traits needed for success in various off-farm occupations

C. Determining Suitable Option For Course Of Study In Advanced Agriculture Education

1. Production agriculture (farming)
2. Agricultural machinery service
3. Agricultural business
4. Horticulture
5. Natural resources management
6. Other options

## II. AGRICULTURAL MECHANICS (95)

UNIT CONCEPT: Approximately one half of the course in Agricultural Science and Mechanics is allotted to agricultural mechanics and is designed to provide the student with instruction basic to occupations in which mechanical aptitudes, abilities, and skills are necessary. This instruction is a prerequisite for entry into options taught in the third, fourth, and fifth years.

## SUGGESTED STUDENT PERFORMANCE OBJECTIVES

1. Given wire, connectors, boxes, switches, etc., students will make electrical splices and install switches and lights according to the electrical code.
2. Given an arc welder, electrodes, protective gear, etc., students will operate an arc welder performing gouging, cutting, piercing, hardsurfacing, beveling, and out of position arc welding functions according to the instructor's standards.
3. Given a small gasoline engine and tools, students will perform a tune-up for maximum performance according to instructor's standards.
4. Given a small gasoline engine, tools, and replacement parts, students will overhaul according to the instructor's standards.
5. Given gas welding equipment, rods, protective gear and etc., students will operate gas welding equipment performing fusion, brazing, and cutting operations according to the instructor's standards.
6. Given power woodworking equipment and tools, students will operate and adjust power woodworking equipment according to the instructor's standards.
7. Given spray painting equipment, paint, and tools, students will operate and adjust spray painting equipment according to the instructor's standards.
8. Given lawn chair, paint, and painting equipment, students will preserve wood constructed items according to instructor's standards.

## EXAMPLES OF STUDENT LEARNING ACTIVITIES

1. Install a light fixture using solderless connectors
2. Make a soldered splice
3. Calculate electrical usage of the arc welder
4. Demonstrate cutting, gouging, and hardsurfacing with the arc welder
5. Weld vertical down and overhead practice pads (4" × 6" × ¼")
6. Set up and adjust gas welding equipment for welding and cutting ¼" mild steel
7. Identify components of small gas engine
8. Overhaul small gasoline engine
9. Perform tune up of small gasoline engine
10. Perform maintenance on small gasoline engine
11. Adjust power woodworking equipment
12. Paint and overhaul a lawnmower

COMPETENCIES

1. Making electrical splices
2. Installing electrical switches and lights
3. Performing out of position arc welding functions
4. Operating an arc welder to perform gouging, cutting, piercing, hard-surfacing, and beveling tasks
5. Operating gas welding equipment to perform fusion, brazing, and cutting operations
6. Overhauling and properly maintaining small gasoline engine
7. Tuning up small gasoline engine
8. Operating, adjusting, and maintaining power woodworking equipment
9. Operating, adjusting, and maintaining spray painting equipment
10. Preserving wood and metal constructed items

A. Understanding The Fundamentals Of Electricity (20)

1. Drawing and understanding electrical symbols
2. Review principles of electricity
   a. Electron theory as it relates to electricity
      (1) Atom
      (2) Proton
      (3) Electron
      (4) Neutron
   b. Magnetism and its relation to electricity
   c. Sources of energy
      (1) Friction
      (2) Magnetism
      (3) Light
      (4) Heat
      (5) Pressure
      (6) Chemical action
3. Understanding electrical terms (Demonstrate)
   a. Electricity
   b. Electrical circuits
      (1) Parallel
      (2) Series
   c. Conductors and insulators
   d. Grounding
   e. Resistance
   f. Volts
   g. Amperes
   h. Watts
   i. Kilowatt
   j. Kilowatt hour
   k. A.C. and D.C. current
   l. Single and three-phase current
   m. Others
4. Calculating electrical cost and needs
   a. Determining kilowatt hour need
   b. How to figure cost
      (1) Regular rate

(2) Special rate
(3) Others

5. Identifying and selecting tools, equipment, and supplies
6. Using safety practices
7. Student practice and application
   a. Draw circuitry diagram
   b. Making splices
   c. Soldering and insulating splices
   d. Using solderless connectors
   e. Install light fixture
   f. Install two two-way switches
   g. Install one three-way switch

B. Welding With The Arc Welder (20)

1. Plan reading
2. Principles involved in arc welding
   a. Gravity
   b. Surface tension
   c. Gas expansion
   d. Electric force
   e. Electro-magnetic force
3. Review safety practices
4. Controlling distortion, warping, and cracking
5. Cleaning and beveling metal
6. Review downhand welding
7. Demonstrate and have student practice the following using the arc welder:
   a. Cutting
   b. Piercing
   c. Gouging
   d. Scarfing
   e. Beveling
   f. Hardsurfacing
8. Demonstrate and have students practice the following:
   a. Horizontal welding
   b. Vertical down
   c. Vertical up
   d. Overhead
   e. Square butt weld in downhand position
   f. Single-vee butt weld
   g. Lap joint fillet weld in flat position
   h. Tee joint fillet in flat position

C. Cutting And Welding With Gas (5)

**Gas Welding**

1. Plan reading
2. Discuss safety practices
3. Understanding gas welding

a. Purpose of oxygen
b. Purpose of acetylene or propane

4. Setting up welding equipment
5. Operating gas welding torch
   a. Gauges and pressures
   b. Selection and maintenance of tips
6. Preparing metal for welding
7. Demonstrate and have students practice the following:
   a. Puddle weld
   b. Fusion weld without rod
   c. Butt weld mild steel with steel rod
   d. Butt weld mild steel with bronze rod
   e. Vee and weld cast iron
8. Discuss briefly:
   a. Hardsurfacing
   b. Heating metal
      (1) Post-heating
      (2) Pre-heating

**Gas Cutting**

1. Plan reading
2. Using safety practices
3. Identifying and selecting tools, equipment, and supplies
4. Basic chemistry of gas cutting
5. Setting up cutting equipment
6. Operating a gas cutting torch
   a. Installing cutting tip
   b. Lighting and adjusting flame
   c. Turning off torch
   d. Cleaning and caring for cutting tip
   e. General procedures in cutting
7. Demonstrate and have students practice cutting exercises

D. Maintaining Small Gasoline Engines (25)

1. Principles of operation
   a. Four-stroke cycle engine
   b. Two-stroke cycle engine
   c. Essentials for combustion
      (1) Fuel
      (2) Air
      (3) Ignition
      (4) Compression

d. Carburetion (Use disassembled carburetor to facilitate)
(1) Venturi
(2) Atomization of fuel
(3) Fuel and air mixtures determined by these factors
(a) Atmospheric conditions
(b) Speed of engine
(c) Load on engine
(d) Other
(4) Maintaining fuel level
(5) Compensating nozzles
(6) Types of carburetors
e. Ignition
(1) Principle of electromagnetic induction
(2) Functions of ignition parts
(a) Magnetic rotor (flywheel)
(b) Coil
(c) Breaker points
(d) Condenser
(e) Spark plug
(f) Battery
(g) Distributor
(3) Electronic ignition
f. Compression
g. Cooling
(1) Stationary cooling fans
(2) Fins on the flywheel
(3) Radiator system
h. Lubrication
i. Governors

2. Use of operator's manual and other reference material
3. Safety practices
4. Maintenance
a. Lubrication
(1) Four-stroke cycle
(2) Two-stroke cycle
b. Ignition
(1) Spark plug
(2) Breaker points and condenser
(3) Armature air gap
(4) Battery
c. Carburetion
(1) Service air cleaner

(2) Clean fuel system
(a) Fuel tanks (c) Carburetor
(b) Fuel lines (d) Fuel pump
(3) Carburetor adjustment

d. Controls
(1) Adjust choke control
(2) Adjust gasoline feed control

e. Students will practice and demonstrate maintenance of small engines

E. Woodworking Using Power (15)

1. Plan reading
2. Using safety practices
3. Identifying and selecting power equipment and accessories
4. Adjustment, care, and operation of:
   a. Circular saw
   b. Radial arm saw
   c. Band saw
   d. Portable saw
   e. Planer
   f. Jointed
   g. Sander
   h. Drill press
   i. Portable drill
   j. Others
5. Students will practice and construct an approved project such as the deluxe saw horse, using power equipment and involving these skills:
   a. Figuring bill of materials
   b. Measuring and marking
   c. Sawing
   d. Routing
   e. Shaping
   f. Drilling
   g. Countersinking
   h. Setting screws
   i. Planing
   j. Nailing
   k. Gluing
   l. Jointing
   m. Sanding
   n. Finishing

F. Preserving Wood And Metal (5)

1. Understanding need for paints and preservatives
   a. Appearance
   b. Protection
      (1) Oxidation
      (2) Moisture
      (3) Insects
      (4) Others
2. Safety practices
3. Selecting and understanding materials used in paints
   a. Pigments
   b. Vehicle

(1) Thinners
(2) Moisture
(4) Oils
(5) Others

4. Selecting paint equipment and supplies
   a. Rollers
   b. Brushes
   c. Mechanical sprayer
   d. Others
5. Wood preservatives
   a. Toxic water solutions (make selection based upon economics and durability of protection.)
      (1) Copper sulphate
      (2) Osmose salts
      (3) Zinc meta arsenite
      (4) Copperized chromated zinc chloride
   b. Toxic oil solutions
      (1) Creosote
      (2) Copper naphthenate
      (3) Nuodex copper
      (4) Pentachlorophenol
      (5) Shellacs
      (6) Varnishes
      (7) Lacquers
6. Metal preservatives (Make selection based upon economics and durability protection.)
   a. Metallic zinc paint
   b. Red and blue lead
   c. Zinc chromate
   d. Iron and zinc oxide
7. Students will practice and demonstrate using preservatives

G. Operating Hazardous Farm Equipment Safely (5)

## III. PRINCIPLES OF ANIMAL SCIENCE (45)

UNIT CONCEPT: A basic understanding of how to select, grade, and feed animals will help a student to become established and advance in the area of livestock production. This unit can help to provide a background for success in off-farm agricultural occupations.

SUGGESTED STUDENT PERFORMANCE OBJECTIVES

Upon the completion of this unit, students will:

1. correctly give the characteristics of five breeds of beef cattle.
2. participate in a judging contest and use correct judging terminology.
3. select the appropriate feeds and balance a ration for dairy cattle according to the instructor's standards.

EXAMPLES OF STUDENT LEARNING ACTIVITIES

1. Give the origin of five beef breeds and four dairy breeds
2. Participate in FFA dairy and/or livestock judging contest
3. Balance a dairy ration for a 1500 pound Holstein cow that produces 14,000 pounds of 3.5 milk annually
4. List the vitamins that are needed by ruminants

COMPETENCIES

1. Identifying the importance, origin, and characteristics of common breeds of animals
2. Selecting and grading animals based upon conformation, pedigree, and performance records
3. Selecting feed and determining feed requirements for farm animals

A. Understanding The Importance, Origin, And Characteristics Of Breeds

1. Beef
2. Dairy
3. Poultry
4. Sheep
5. Swine

B. Selecting And Grading Animals

1. Importance of selecting and grading
2. Judging terminology
3. Breed characteristics
4. Use of score card for each class
5. Placing
6. Pedigree and performance records

APPLICATION

1. Analyze pedigree and performance records
2. Participate in judging contests and use placing cards

C. Feeding Animals

1. Identifying nutrient needs of farm animals
   a. Uses of nutrients by animals
   b. Composition of animal bodies
   c. Composition of products produced by animals
   d. Water
   e. Vitamins

2. Understanding how farm animals use feeds
    a. Relationship of feed nutrients to body function
    b. Differences in plants and animals
    c. Processes in use of feeds by animals
        (1) Digestion and absorption of feeds
    d. Types of digestive systems
3. Using pasture in feeding livestock
    a. Feeding value
    b. Kinds
    c. Effect of growth and maturity of pasture plants
    d. Economics of good pasture
    e. Supplying and utilizing pastures
4. Using harvested forages in feeding livestock
    a. Types
    b. Feeding value
    c. Using roughages
    d. Providing forage
        (1) When
        (2) Amount
        (3) Quality
5. Using grains in feeding livestock
    a. Classification and importance
    b. General characteristics
    c. Specific characteristics
6. Using protein supplement
    a. Classification and importance
    b. Characteristics and principal uses
    c. Effects of feeding protein
7. Providing minerals
    a. Functions
    b. Minerals needed
    c. Mineral content of feeds
    d. Supplying minerals
    e. Methods of feeding
8. Feeding practices

APPLICATION

1. Determine feed requirements for livestock
2. Select feed for livestock

## IV. RURAL AND URBAN LIVING (10)

UNIT CONCEPT: Landscaping and maintaining the home grounds will greatly increase the value of the home and provide the student with many hours of personal satisfaction and relaxation.

SUGGESTED STUDENT PERFORMANCE OBJECTIVES

1. Given landscape materials and tools, students will plant a shrub on their home grounds according to the instructor's standards.
2. Given drawing materials and equipment, students will prepare a landscape plan according to the instructor's specifications.
3. Given shrubs on the school farm, students will care for planted material according to the instructor's standards.
4. Given equipment, tools, fertilizer, seed, etc., students will establish a lawn according to the instructor's standards.

EXAMPLES OF STUDENT LEARNING ACTIVITIES

1. Draw a landscape plan and show the placement of appropriate landscape materials
2. Establish and maintain a lawn
3. Apply pesticides to control insects and diseases on home shrubs and trees
4. Prune home shrubbery

COMPETENCIES

1. Preparing a landscape plan and selecting suitable landscape materials
2. Establishing and maintaining a lawn
3. Caring for planted landscape material

A. Developing An Appreciation For Attractive Home Grounds

B. Preparing A Landscape Plan
   1. Grading and drainage
   2. Driveways
   3. Walks
   4. Family living and recreational area
   5. Service area
   6. Garden area
   7. Front lawn

C. Selecting Landscape Materials

D. Establishing And Maintaining Lawns

E. Caring For Planted Materials

F. Developing And Carrying Out A Home Landscape Plan

## V. LEADERSHIP TRAINING II (10)

UNIT CONCEPT: Active participation in the FFA will provide the student opportunities for developing competencies in such areas as leadership, cooperation, citizenship, scholarship, and supervised agricultural occupational experience.

SUGGESTED STUDENT PERFORMANCE OBJECTIVES

With FFA as an integral part of agricultural education, students will:

1. demonstrate the principles of parliamentary procedure as presented in Robert's Rules of Order, Revised, or other appropriate references with 90% accuracy.
2. participate in the FFA awards program and degrees as outlined in the Virginia FFA Activity Handbook.
3. write and deliver a public speech according to the rules governing the national contest.
4. compete for chapter offices as outlined in the official FFA manual.

EXAMPLES OF STUDENT LEARNING ACTIVITIES

1. Participate in a junior parliamentary procedure contest
2. Outline the awards and degrees that are available to FFA members
3. Give a class report on the FFA constitution
4. Write and deliver a prepared public speech
5. Apply for a chapter office

COMPETENCIES

1. Demonstrating the principles of parliamentary procedure in FFA and other business meetings
2. Delivering a prepared public speech
3. Participating in the FFA student award program and degrees
4. Applying for a chapter office

A. Understanding, Practicing, And Demonstrating Parliamentary Procedure

1. Why study parliamentary procedure
2. Parliamentary practice
   a. Obtaining the floor
   b. Correct way to phrase motions and amendments

c. Discussion of motions
d. Voting on motions
e. Maintaining order members and chairperson

3. Main motion
   a. Purpose
   b. Amendable
   c. Debatable
4. Amendments
5. Motion to refer
6. Privileged motions
7. Point of order
8. Division of assembly
9. Previous question

B. Understanding FFA Student Awards Program And Degrees
1. Foundation awards
2. Chapter Farmer Degree
3. State Farmer Degree
4. American Farmer Degree

C. Developing An Understanding Of The FFA Constitution
1. Articles I-B

D. Understanding And Practicing Public Speaking
1. Selecting subject
2. Selecting title
3. Securing information
4. How to write a public speech
5. How to deliver a public speech

E. Developing An Understanding For Applying For A Chapter Office APPLICATION
1. Participation in FFA and other school activities
2. Participation in church activities
3. Participation in community activities

## VI. RESOURCE CONSERVATION (15)

UNIT CONCEPT: It is important for students to develop an appreciation for conservation and develop a plan for improving natural resources in their home community.

## SUGGESTED STUDENT PERFORMANCE OBJECTIVES

Upon the completion of this unit, students will:

1. name and identify by sight fifteen forest trees common to Virginia with 100% accuracy.
2. correctly list three game and fish laws in Virginia.
3. practice contour strip cropping according to soil conservation service standards.
4. develop appropriate plans to conserve resources on their home farm and/or community.

## EXAMPLES OF STUDENT LEARNING ACTIVITIES

1. Participate in the Keep Virginia Green Program (KVG)
2. Lay out a contour strip using the transit or level
3. Plant trees and grasses in eroded fields
4. Outline a plan to prevent water pollution
5. Cut undesirable species of forest trees for fire wood
6. Stock farm pond with bass and bluegills

## COMPETENCIES

1. Identifying Virginia forest trees
2. Listing game and fish laws in Virginia
3. Laying out contour strips
4. Planting forest trees
5. Conserving resources

A. Conserving Our Soil And Water

1. Drainage systems
2. Planting trees and grasses
3. Controlling water pollution
4. Water system for home and farms
5. Farm ponds in agriculture
6. Contour farming
7. Strip cropping
8. Organic matter in the soil

B. Conserving Our Forest And Wildlife Resources

1. Place of forestry in farming programs
2. Tree identification
3. Planting trees
4. Managing the forest
5. Common game animals in Virginia

6. Game and fish laws in Virginia
7. Managing wildlife in Virginia

C. Students will develop a plan for improving natural resources in their home community. Students will be actively identified with the KVG Program.

## AGRICULTURAL SCIENCE AND MECHANICS II REFERENCES

I AGRICULTURAL ORIENTATION

5, 20, 46, 59, 70, 73, 80

II AGRICULTURAL MECHANICS

1, 3, 7, 13, 15, 19, 21, 22, 23, 27, 28, 29, 30, 31, 32, 36, 37, 38, 40, 41, 42, 43, 47, 48, 49, 50, 51, 52, 53, 54, 55, 61, 62, 64, 66, 69, 71, 76, 77, 85, 88, 89, 91, 92, 96, 97, 99

III PRINCIPLES OF ANIMAL SCIENCE

12, 16, 56, 58, 60, 65, 78, 82, 83, 84, 90

IV RURAL AND URBAN LIVING

6, 18, 33, 46, 65, 75, 79, 93

V LEADERSHIP TRAINING

8, 25, 26, 34, 39, 63, 72

VI RESOURCE CONSERVATION

4, 10, 17, 74, 82, 83, 84

(Refer to list of references in the back of this publication. The above numbers refer to the publication, author, and publisher in the list of references.)

## SUGGESTED INSTRUCTIONAL MATERIAL AND REFERENCES FOR THE COURSE OUTLINE

SOURCES OF INSTRUCTIONAL MATERIALS:

A. Tools, equipment, seed, nursery, and other commercial catalogs as made available by the various commercial firms.

B. Collected prepared specimens—seed, fertilizer ingredients, insects, feed, plant materials, equipment, and supply displays.

C. State Extension Service publications. Many excellent bulletins are available from various states. Virginia Tech materials are listed in Extension Division Publication #9, Extension Publications for your use, available from Distribution Office, Extension Division Publications, VPI and SU, Blacksburg, Virginia 24061.

D. Printed curriculum materials, filmstrips, film and slides, available from various commercial sources and from state educational agencies, either state departments of education or state universities. Some suggested sources are:

1. Vocational Education Publications, California State Polytechnic College, San Luis Obispo, CA 93401
2. Vocational Agriculture Service, University of Illinois, Urbana, Illinois 61801
3. Vocational Instructional Materials Laboratory, Terre Haute, IN 47809
4. Education Institute, Agri-Business and Natural Resources Education, Michigan State University, East Lansing, MI 48823
5. Ohio Agricultural Education Curriculum Materials Service, Ohio State University, Room 254, 2120 Fyffe Road, Columbus, Ohio 43210
6. Agricultural Education Instructional Materials, Department of Agricultural Education, 102 Armsby Building, Pennsylvania State University, University Park, PA 16802
7. Department of Agricultural Education, Texas A & M University, College Station, TX 77840
8. American Association for Vocational Instructional Materials, Engineering Center, Athens, GA
9. Publications Division, Office of Communication, U.S. Department of Agriculture, Washington, D.C. 20250. List No. 11, List of Available Publications of the United States Department of Agriculture

10. Environmental Education Materials, National Science Teachers Association, 1201 Sixteenth Street, NW, Washington, D.C. 20036
11. Hobar Publications, 1305 Tiller Lane, St. Paul, MN 55112
12. Educational Motion Pictures For Virginia's Public Schools, Bureau of Teaching Materials, Department of Education, Commonwealth of Virginia, Richmond, Virginia 23216

Modern and Appropriate 16 mm sound and color commercial films may be secured rent free from the following sources:

13. Vernard Film
Box 1332
Peoria, Illinois 61654
14. Modern Talking Picture Service, Inc.
2000 L Street N.W.
Washington, D.C. 20036
15. John Deere
John Deere Road
Moline, Illinois 61265

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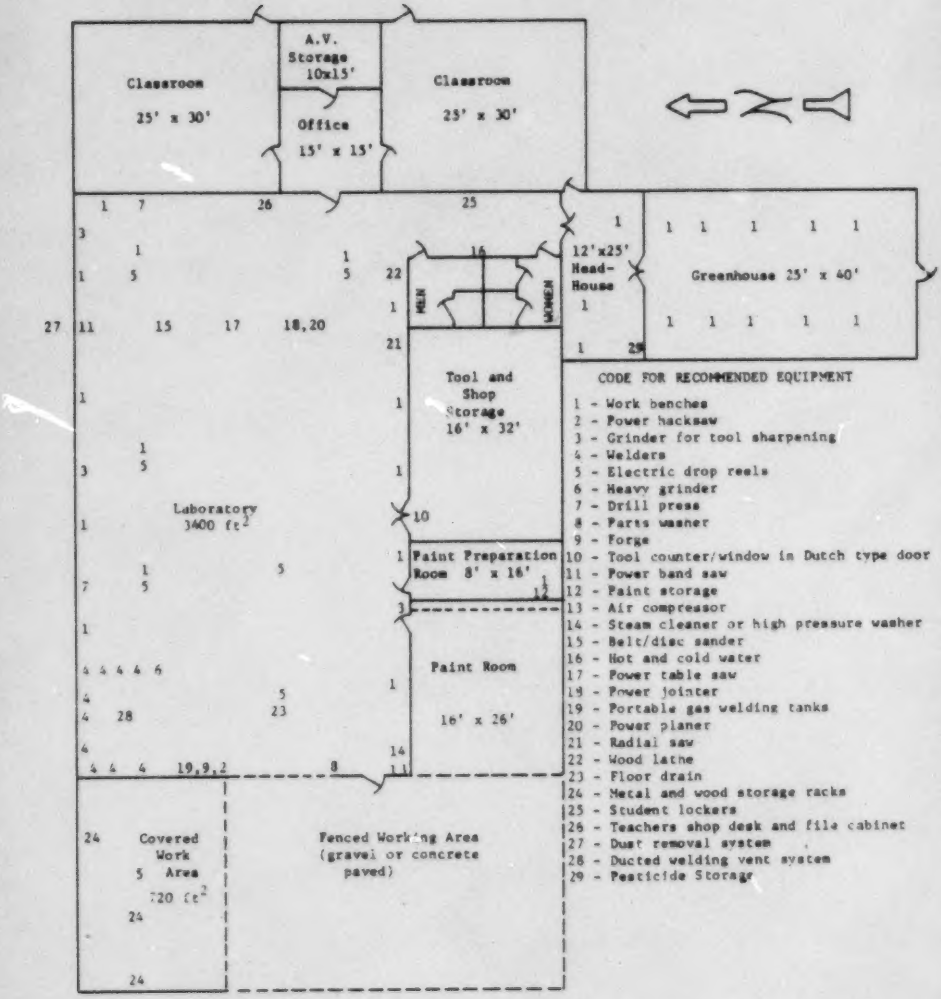
# RECOMMENDED FACILITY PLANS




CODE FOR RECOMMENDED EQUIPMENT

1 - Work benches
2 - Power hacksaw
3 - Grinder for tool sharpening
4 - Welders
5 - Electric drop reels
6 - Heavy grinder
7 - Drill press
8 - Parts washer
9 - Forge
10 - Tool counter/window in Dutch type door
11 - Power band saw
12 - Paint storage
13 - Air compressor
14 - Steam cleaner or high pressure washer
15 - Belt/disc sander
16 - Hot and cold water
17 - Power table saw
18 - Power jointer
19 - Portable gas welding tanks
20 - Power planer
21 - Radial saw
22 - Wood lathe
23 - Floor drain
24 - Metal and wood storage racks
25 - Student lockers
26 - Teachers shop desk and file cabinet
27 - Dust removal system
28 - Ducted welding vent system
29 - Pesticide Storage

## RECOMMENDED INCLUSIONS FOR AN AGRICULTURAL MECHANICS I AND II FACILITY

| | |
|---|---|
| Exhaust | — paint preparation room have exhaust fan and vented storage cabinet |
| | — welding stations should be exhausted away from students |
| Floors | — laboratory floor be made of concrete with sufficient thickness to support weight of the heaviest load the facility will encounter. All concrete floors should be sealed. |
| Shop drain | — drain be provided with drainage into a settling basin |
| Wash area | — exterior concrete wash area be provided with drainage into a settling basin. |
| Walls | — height of walls 16′ minimum or dictated by machinery size |
| | — be treated with epoxy paint or equivalent material for cleaning purposes. Treated area should be minimum of 7′ high. |
| | — color be light, example yellow, white, etc. |
| Doors | — equipment entrance doors be 16′ wide and 14′ high |
| | — exterior passage way doors be provided adjacent to equipment entrance doors. |
| | — parts storage and tool-storage room doors be 42″ wide or a double door. |
| Electrical Service | — minimum of 600 AMP service be provided |
| | — master shut off switch be provided |
| | — ground fault interrupters be wired into circuitry |
| | — welding outlet be provided at laboratory center and rear entrance as well as in welding areas |
| Heat | — have provisions for independent heat control for the laboratory |
| Lighting | — general lighting requirements for the laboratory 50-100 foot candles |
| Loading Ramp | — be provided and located outside the fenced in area with 360° access. |

| | | |
|---|---|---|
| Hot Water | — | be provided in hand washing and equipment cleaning areas |
| Compressed Air | — | outlets be located at 40′ intervals around exterior walls |
| | — | compressor be located in out of the way storage area if possible |
| Safety Glasses | — | storage and sanitary cabinet be located at the primary student entrance area of the laboratory |
| Roof Strength | — | roof trusses should be of suffient strength to support chain hoists and other equipment for lifting agricultural equipment. |

# LIST OF RECOMMENDED EQUIPMENT AND TOOLS
# AGRICULTURAL SCIENCE AND MECHANICS

## A. HAND TOOLS

| ITEM | DESCRIPTION EXAMPLES | QUANTITY |
|---|---|---|
| Anvil | 100 lb. size; Milwaukee 100AS | 1 |
| | Stand; 24" high; laminated hardwood top surface, Angle Steel #107 | 1 |
| Awl | Scratch; 3¾" blade; Stanley 117 | 5 |
| Bars | Pry; 16" long × 9/16" stock; Snap-On 1650 | 2 |
| | Pry; 13⅜" long × 1¾" wide; nail puller; Stanley H515 | 2 |
| | Wrecking; ¾" × 24"; gooseneck with slotted claw and chisel end; Stanley 124 | 1 |
| | Wrecking; ¾" × 18"; gooseneck with slotted claw and chisel end; Stanley 118 | 1 |
| Battery tools | Filler; 2¼ qt. capacity; Brookins 402 | 1 |
| | Hydrometer; E. Edelmann & Co. | 1 |
| | Service kit; contains a battery brush, terminal spreader, terminal puller, and battery pliers; K & D 209 | 1 |
| Bevel | Sliding T; 8" blade, 5½" wooden handle; Stanley 25TB | 2 |
| Bits | Auger; Mos. 4 to 16 by 16ths; Irvin DR | 2 |
| | Countersink; rose type; square taper shank; ¼" cutting edge; Stanley #139 | 4 |
| | Countersink; 82° angle; ¼" round shank; General Mfg. 191 | 2 |
| | Drill points; Nos. 1DP to 8DP; STanley #9DP | 1 set |
| | Expansion; ⅞" to 3" with micro-dial; Irwin 22 | 2 |
| | Hole saw; 1" to 2½" by halves; Arco 600 | 1 |
| | Screwdriver; square taper shank; ¼" × 5", ⅜" × 5", and ½" × 5"; Irwin 700 | 1 set |

| ITEM | DESCRIPTION EXAMPLES | QUANTITY |
|---|---|---|
| | Screw-mate drill and countersink; ¾" × No. 6, 1" × No. 8, 1¼" × No. 10, 1½" × No. 12; Stanley 1525A | 1 set |
| | Screw-sink combination countersink-counterbore; ¾" × No. 6, 1" × No. 8, 1¼" × No. 8, 1½" × No. 10, 2" × No. 12; Stanley 15245 | 1 set |
| | Speedbore; ⅜" to 1" by 8ths; Irwin 886R | 1 set |
| | Twist; 1/16" to ½" by 32nds; high speed steel; round shank; in a metal box; Hanson 215 | 1 set |
| | Twist; ½" to 1" by 8ths; high speed steel taper shank; Butterfield 500 series | 1 set |
| | Twist; metric; 1.00 mm to 13 mm by .5 mm; round shank in a metal box; Thomas Ind. 21925 | 1 set |
| Box | Mitre; 4" × 24" with 14 pt. back saw; Stanley 2244A | 1 |
| | Oil stone; 8" × 2" × 1"; Angelo S439C | 4 |
| Brace | 10" sweep ball bearing head; Stanley 945 | 2 |
| Brushes | Bench; 8" × 2½"; Empire-King | 8 |
| | Paint; 2"; Ruberset #115 | 8 |
| | Paint; 2½"; Ruberset #115 | 4 |
| | Paint; 3"; Ruberset #115 | 4 |
| | Parts; 3 adjustable positions; Grey Mill 2A | 2 |
| | Stencil; ¾" size; Grumbacher 5740 | 2 |
| | Wire; 6" × 1" with 14" overall length; Empire A-40 | 10 |
| Buckets | 10 qt. capacity; zinc coated; O-Reeves 4101 | 2 |
| Cans | Oily waste; 10 gal. capacity; with foot lever; Justrite Mfg. 9-300 | 1 |
| | Safety; 2 gal. capacity; with screen; Justrite 10501 | 1 |
| | Safety; 5 gal. capacity; with screen; Justrite 10801 | 1 |

| ITEM | DESCRIPTION EXAMPLES | QUANTITY |
|---|---|---|
| Calipers | Inside; 6";; Starrett 73 | 1 |
| | Outside; 6"; Starrett 79 | 1 |
| | Vernier; inch/millimeters; 6" × 150 mm; Fowler 52-059-016 | 1 |
| Card | File; Cooper Group - 21467 | 4 |
| Chisels | Cape; ⅜" × ½" × 7"; Stanley 751C | 2 |
| | Cold; ¼" to 1" by 8th; (sets); Stanley 740-747 | 2 sets |
| | Cold; ⅜" and 1"; (each) Stanley 744 and 747 | 2 each |
| | Diamond point; ⅜" × ½" × 7"; Stanley 771 | 2 |
| | Roundnose cape; ⅜" × ½" × 7"; Stanley 766 | 2 |
| | Wood; ¼" to 1" by 4ths; Stanley 66 | 4 |
| | Wood; ½"; Stanley 60C | 8 |
| Clamps | "C"; 4", 6", 8" and 10"; (set) Standard 54 | 3 sets |
| | Hand screw; 10" jaw length; Jorgensen 1 | 4 |
| | "I" Bar; 4 ft. opening; Margrave 640 | 4 |
| | Mitre and Corner; 2" to 14" capacity; ¼" screw dia.; Margrave 780 | 1 |
| | Vise-grip; welding; 9"; 2¾" jaw width; Peterson 9R | 2 |
| | Vise-grip; "C" clamps; 3¼" jaw adj.; Peterson 11R | 2 |
| Cutters | Bolt; ⅛" capacity in hard metal; 24' long; H. K. Porter - 190MNE | 1 |
| | Pipe; ⅛" to 2" capacity; Ridgid 2-A | 2 |
| | Tubing; ⅛" to 1" capacity; General 125 | 2 |
| Dividers | Wing, 8"; Starrett 83 | 1 |
| Drain Pan | 10 qt. capacity; Brookins - 673 | 2 |
| Drawing | Kit to include one each of: Alvin SB505<br>18" × 24" drawing board<br>21" blade T-square<br>12" architect scale<br>10" 30-60-90 degree triangle | 1 |

| ITEM | DESCRIPTION EXAMPLES | QUANTITY |
|---|---|---|
| | 8" 45-45-90 degree triangle<br>Irregular curve<br>6" semi-circular protractor | |
| Dresser | Grinding wheel; complete with 2 sets of cutters; hooded; Huntington 0 | 2 |
| Drills | Hand; ¼" capacity; 12" long; Stanley 610 | 2 |
| | Push; 11½" long; with 8 drill points 1/16 to 11/64; Stanley 41YC | 2 |
| Engraver | Electric; with carbide tipped point; 120 volt, 60 hz.; Chicago Wheel - 11-111 | 1 |
| Extension cord | 50 ft.; 14-3 wire; SJT wire type; Eagle 626 | 2 |
| Files | Augerbit; 7"; Nicholson | 2 |
| | Chain saw; 8"; 7/32" diameter; Nicholson | 4 |
| | Crosscut; 8"; Great American | 2 |
| | Flat; second cut; 10"; Nicholson | 3 |
| | Hand; smooth; 10"; Nicholson | 2 |
| | Mill; bastard; 10"; Nicholson | 3 |
| | Points; 5-14"; Cooper Group - 02373 | 2 |
| | Round; bastard; 6"; Nicholson | 1 |
| | Round; bastard; 10"; Nicholson | 1 |
| | Square; second cut; 6"; Nicholson | 1 |
| | Square; second cut; 10"; Nicholson | 1 |
| | Taper; extra slim; 5"; Nicholson | 3 |
| | Taper; double extra slim; 6"; Nicholson | 3 |
| | Three square; second cut; 8"; Nicholson | 1 |
| Flaring Tool | 3/16" to ⅜"; General 155 | 1 |
| Funnels | Tractor; 10" dia., 4" deep; Lock-On | 1 |
| | Utility; 1 qt. capacity; Huffy 4411 | 2 |
| Gauges | Depth; 6"; readings in 32nds and 64ths; Starrett 237 | 1 |
| | Grinding; General 16 | 10 |
| | Spark plug gap; 6 wires; .025 to .040"; K & D 166 | 4 |
| | Sheet metal; 0 to 30 gauge; General 21 | 1 |
| | Telescoping; ½" to 6"; set of 6 gauges; Starrett S229G | 1 |

| ITEM | DESCRIPTION EXAMPLES | QUANTITY |
|---|---|---|
| | Thickness; 32 blades; .010 to .035"; K & D 16-1 | 4 |
| | Tire; tractor; 5-45 psi; liquid or dry; Sears | 2 |
| | Wire; 0-30 gauge nos.; General 20 | 1 |
| Gloves | Asbestos; long cuff; medium and small sizes; pairs; Steiner - 02329 | 20 pairs |
| Guns | Caulking; half barrel; DAP #101 | 2 |
| | Grease; cartridge type; Lincoln | 1 |
| | Pop rivet; sets 1/8" and 3/16" dia. rivets; Rivetool 110 | 1 |
| | Soldering; kit to contain dual heat gun, soldering tip, smoothing tip, cutting tip, and tip changing wrench; Weller D-550-PK | 1 |
| | Staple; Swingline 900 | 1 |
| | Suction; 15" flexible hose; 20 oz. capacity; Western Auto 15-1189-8 | 1 |
| Hammers | Ball peen; 8, 12, 16, and 20 oz.; Stanley Jobmaster | 2 each |
| | Ball peen; 24 and 32 oz.; Stanley Jobmaster | 1 each |
| | Claw; curved; 13 and 16 oz.; Stanley Jobmaster | 5 each |
| | Claw; straight ripping; 16 and 20 oz.; Stanley Jobmaster | 5 each |
| | Machinist's (Blacksmith's); 40 oz.; Stanley 402 | 2 |
| | Riveting; 7 oz.; Stanley 231 | 2 |
| | Sledge; 4 and 8 lbs.; double face; Stanley 850H | 1 each |
| | Soft face; plastic tip; 4 and 8 oz.; Stanley 593 and 594 | 1 each |
| | Tack; 5 oz.; Stanley H304 | 2 |
| Handles | File; Skroo Zon No. 4 | 1 doz. |
| | File; Skroo Zon No. 6 | 2 doz. |
| Hatchet | Shingle; 2½" cut; Stanley 59-135 | 1 |
| | Broad; 4½" cut; Stanley 59-145 | 1 |

| ITEM | DESCRIPTION EXAMPLES | QUANTITY |
|---|---|---|
| Hoe | Garden; 6″ × 4″ blade; 4½ ft. handle; True Temper G062 | 1 |
| Hose | Garden; Rubber; ¾″ × 50′; full-flo couplings; Gate Mfg.-Valco | 2 |
| Hydrometer | Battery; E. Edelmann & Co. | 1 |
| Index | Drill; 1/16 to ½″ by 32nds; Hanson 15 | 1 |
| Iron | Soldering; electric; 175 watts; Marksman SP175 | 2 |
| Knife | Electricians' pocket; Channellock #11 | 2 |
| | Putty; 1¼″ blade; stiff; Red Devil 4101 | 4 |
| Ladder | Step ladder; 6 ft.; wooden; Caroline-Mechanic | 1 |
| Level | Carpenter's; 24″; 3 vial; aluminum; Stanley H1297 | 2 |
| | Line; 3-14″; 1 vial; aluminum; Stanley 183 | 2 |
| | Torpedo; 9″; 3 vial; hardwood; Stanley 260 | 2 |
| Light | Timing; 6 or 12 volt battery powered; Marquette 41-220 | 1 |
| | Trouble; 25 ft. cord; 18-2 SJ cord; Rodale-368-25 | 2 |
| Line | Chalk; 50′; aluminum case; Stanley 47-150 | 2 |
| Magnet | Pickup; 18″ to 28″; General 384 | 2 |
| Mallet | Rubber; 5″ × 2⅛″; black; Schacht Mfg.-352-4 | 1 |
| | Wood; 5″ × 2½″; straight sides; Surpless #2 | 1 |
| Meters | Volt-ammeter-ohmmeter; clamp-on type; Dayton 4x221 | 1 |
| Micrometer | Outside; 0-1″; Starrett 436 RL | 10 |
| | Outside; 0-25 mm; .01 accuracy; Starrett 436 MRL | 1 |
| | Outside; 0-4″; in leatherette case; Central 40RL | 1 |

| ITEM | DESCRIPTION EXAMPLES | QUANTITY |
|---|---|---|
| | Inside; 2″-8″; in leatherette case; Central 85 | 1 |
| | Depth; 7/16″ to 2½″; in leatherette case; Central 103 | 1 |
| Mirror | Round; 8″ long hand; Snap-on JT-3 | 2 |
| Monitor | Safety glasses; 29″ × 35″ × 12″; complete with 36 glasses and 8 goggles; Sellstrom 880 | 1 |
| Oilers | General purpose; ½ pint; 6″ spout; Eagle | 4 |
| | Pump type; ¾ pint; 6″ straight spout; Eagle 66 | 2 |
| | Tapper and pourspout; 1 qt. capacity; Swing Spout #5 | 2 |
| Plane | Bench; smooth bottom; 9¾; Stanley 4 | 1 |
| | Block; 6″; adjustable; low angle; Stanley 60-1/2P | 1 |
| | Jack; corrugated bottom; 14″; Stanley 5C | 1 |
| Pliers | Battery; 8″; Duro-2116 | 2 |
| | Channel lock; 7″; Crescent R27-7C | 2 |
| | Combination; 6″ and 8″; Crescent G26V and G28V | 10 each |
| | Diagonal cutting; 7″; Crescent 542C-7 | 2 |
| | Electrician's; 8½″; with crimping die; Ideal 30-420 | 1 |
| | Hose Clamp; 8½″; K & D 429 | 1 |
| | Ignition; 5″; Duro-Chrome 2110 | 1 |
| | Lineman's; 7″; Crescent 50-7 | 2 |
| | Needle nose; 7″; Crescent 650-7 | 5 |
| | Nippers; end cutting; 7″; Crescent 72-7 | 5 |
| | Snap ring; set of internal and external; K & D 444 | 1 set |
| | Spark plug terminal; insulated; K & D 135 | 2 |
| | Vise grip; 7″ and 10″; Petersen 7R and 10R | 2 each |

| ITEM | DESCRIPTION EXAMPLES | QUANTITY |
|---|---|---|
| Pullers | Gear and whell; reversible jaws; up to 7" spread; 5½" reach; 3 jaws; Old Forge 2307 | 1 |
| Punches | Center; ⅛" tip, 11/16" stock, 4" long; Stanley 10¾ | 4 |
| | Drift (Long taper); ½" stock, 9½" long; Stanley 798 | 4 |
| | Pin; ⅛" pt. dia., ⅜" stock; 6" long; Stanley 790 | 4 |
| | Prick; ⅜" stock; 5" long; Stanley 796 | 2 |
| | Solid (Starting); ¼" pt., ⅜" stock, 6" long; Stanley 785 | 4 |
| Rake | Garden; 15 tooth; 5 ft. handle; True Temper B15 | 1 |
| Rasp | Cabinet; 10"; second cut on edges; Pk. of 6; Cooper Group - 17663 | 1 pkg. |
| Reamer | Burring; bit shank; ¼" to 2"; Hanson 135 | 2 |
| Respirator | Dust mask; box of 50; 3M 8500 | 1 box |
| | Paint mask; neoprene filter; Willson 2D | 2 |
| Rules | Bench; 24" × 1¼"; graduated in 8ths; Stanley 34VR | 2 |
| | Folding; metric/English/2 meters in millimeters; 6 ft. in 16ths; Stanley 714MC | 10 |
| | Tape rules; ½" blade; metric/English; 2 meters long; Stanley P2ME | 4 |
| | Tapes; metric/English; ⅜" blade; 20 meters long; Stanley 52-220 | 1 |
| Saws | Back; 13 pt.; 14" long; Stanley 1514 | 1 |
| | Compass; 8 pt.; 12" blade; Stanley 39-212 | 1 |
| | Coping; 6⅜" × 6¾"; Stanley 39-106 | 1 |
| | Crosscut; 26"; 8 pt.; Stanley 39-108 | 8 |
| | Hack; adjustable frame; 12" capacity; Stanley H1265 | 5 |
| | Hack; low-clearance; 8¾" long; Stanley 15-210 | 1 |
| | Keyhole; pistol grip handle; Stanley 175C | 1 |
| | Rip; 26"; 5½ pt.; Stanley 15-105 | 5 |

| ITEM | DESCRIPTION EXAMPLES | QUANTITY |
|---|---|---|
| Scissors | Straight; 9″; Wiss 39 | 2 |
| Scrapers | Carbon; ¼″ shank, 1″ blade, 12″ long; Snap-on CSA-12 | 1 |
| | Hand; reversible blade; 6½″ × 1½″; Stanley 291-½ | 2 |
| | Gasket; 1½″ blade; 7½″ long; Snap-on PK-13 | 1 |
| Screwdrivers | Offset; phillips head; Nos. 1 & 2; Stanley 2612 | 1 |
| | Offset; slotted head; 11/32″ head; 5″; Stanley 670 | 1 |
| | Regular; phillips head; No. 1 pt.; 6″ Stanley 2751 | 2 |
| | Regular; phillips head; No. 2 pt.; 7¾″; Stanley 2752 | 2 |
| | Regular; phillips head; No. 3 pt.; 10½″; Stanley 2753 | 1 |
| | Regular; slotted head; 4″, 6″, & 8″; Stanley 1006 | 2 each |
| | Regular; slotted head; 10″ & 12″; Stanley 1006 | 2 each |
| | Stubby; slotted head; 3¾″; Stanley 1009 | 2 |
| | Spiral ratchet; with 7/32 & No. 2 bits; 15″; Stanley 130 | 2 |
| Screw Extractor | Size 1 through 6 in a box; high speed steel; Hanson - 52445 | 1 set |
| Set | Nail; 3/32″ pt.; 4″ long; Stanley 11¾ | 2 |
| | Rivet; Size 0; PEXTO 46-0 | 1 |
| Shields | Face; 8″ × 11″ × .040″ clear plastic; positive head lock; Sellstrom 380 | 8 |
| Shovel | Round pt.; longhandle; Size 2; Truetemper Mfg. DLR | 1 |
| | Scoop: D handle; aluminum; Size 12; Truetemper Mfg - BAG-12 | 2 |
| | Square pt.; D handle; Size 2; Truetemper Mfg. #DS | 2 |

| ITEM | DESCRIPTION EXAMPLES | QUANTITY |
|---|---|---|
| Small Engine Tools | Small engine tools mounted on a 19″ × 25″ display board; ZIM SD-2 | 2 |
| | Briggs & Stratton special repair kits and tools; Briggs & Stratton 291661 | 2 |
| | Basic small engine tool kit; contains ⅜″ ratchet, ⅜″, 7/16″, & ½″ sockets; 2 extensions; spark plug socket; ¼″ & 7/16″ nut drivers, 6½″ long nose pliers; 4″ & 6″ slotted screwdriver; No. 2 phillips screwdriver; ⅜″ & 7/16″ & ¼″ × 5/16″ open end wrenches; round & flat feeler guage set; spark plug tester; all in a 6½″ × 19″ tool box; ZIM SD-1 | 6 |
| Snips | Curved blade; 3″ cut; 12½″ long; Wiss W9CB | 1 |
| | Combination; 3″ cut; 12½″ long; Wiss W19 | 2 |
| Sprayer | 3 gal. capacity; compression type; Hudson 335 | 1 |
| Squares | Carpenter's (Framing); 16″ × 24″ × 1/16″; with rafter tables; aluminum; Stanley AR100 | 5 |
| | Combination; 12″ removable blade; 4⅛″ handle; Stanley 122 | 5 |
| | Combination; 12″; with center head, protractor head, & square head; Starrett 435 | 1 |
| | Try; 6″; Stanley 12TS | 4 |
| Stamps | 0-9; 3/16″; Reeves - 05271 | 1 set |
| | A-Z; 3/16; Reeves - 05090 | 1 set |
| Stencils | 0-9; 2″; Reeves | 1 set |
| | A-Z; 2″; Reeves | 1 set |
| Stone | Oil; combination, course & fine; 8″ × 2″ × 1″; Norton JB8 | 4 |
| Stripper | Electrical wire; 8½″ long; No. 10 to 18 solid wire; Stanley 84-203 | 2 |
| Surform | File type; regular cut blade; 15¾″ × 1⅜″; Stanley 295 | 2 |

| ITEM | DESCRIPTION EXAMPLES | QUANTITY |
|---|---|---|
| Tackometer | Speed indicator; hand held; 0-5000 rpm; two rubber tips in addition to steel tip; Starrett 107 | 1 |
| Tap & Die Set | ¼" to ¾" NF and NC taps and dies; with die stock and tap wrench; in a hinged box; Hanson 381614 | 1 set |
| | Metric; 3 mm to 12 mm; with die stock and tap wrench; metric screw pitch gauge; in a plastic box; Hanson 381614 | 1 set |
| Thread Chaser | Spark plug; 18 mm and 1 mm; RIMAC-SP-1 | 1 |
| Threader | Pipe; drop-head; ⅛" to 1¼" NPI; includes stock and tray; Reed 72-1 | 1 |
| Tongs | Curved lip; 20"; to hold ½" rods; Warren tool 202 | 2 |
| | Straight lip; 18"; ⅜" × 1" lip size; Warren tool 203 | 2 |
| Tester | Anti-Freeze; K & D 2119 | 1 |
| | Continuity; 4 ft. removable cord, 5½" long; Ideal - 61030 | 1 |
| | Current; 110 volt to 550 volt; Rodal-18 | 2 |
| Tube Bender | Spring-type; set of 6; ¼" to ⅝" O.D.; General S106 | 1 set |
| Valve Tool | Tire; inside rethreader and valve core wrench; RIMAC-43 | 2 |
| Vise | Drill Press; angle type; Columbian 225 | 2 |
| | Machinist's; 3½" jaws; swivel base; Columbian D43-½ | 3 |
| | Machinist's; 5" jaws; stationary base; Columbian | 1 |
| | Pipe; ⅛" through 2" capacity; Rigid 21 | 2 |
| | Woodworking, 7" Rapid Action; Wilton 51W | 10 |
| Wheelbarrow | 4 cu. ft.; 4.00 × 8" Pneumatic tire; Jackson MIIT-24 | 1 |

| ITEM | DESCRIPTION EXAMPLES | QUANTITY |
|---|---|---|
| Wrenches | Adjustable; 8″, 10″, & 12″; Crescent | 2 each |
| | Box end; 8 piece set; long pattern; ⅜″ through 1″; Thorsen BX-8 | 1 set |
| | Chain; ¾″ to 4″ capacity; Armstrong CW4 | 1 |
| | Combination; 11 piece set; ⅜″ through 1″; Thorsen BOE-11 | 2 sets |
| | Combination; metric; 8 piece set; 7 mm through 14 mm; Thorsen MC-8 | 1 set |
| | Crankshaft; for small engines; K & D 2090 | 1 |
| | Hex; knife type; 12 wrenches, 5/64″ through ¼″; Supreme #18 | 2 sets |
| | Hex; metric; knife type; 7 wrenches 1.5 mm through 6 mm; Supreme M17 | 1 set |
| | Ignition; 10 piece set; 13/64″ through 11/32″; S-K 1610 | 1 set |
| | Nut driver; solid shaft; Nos. 6-12 (3/16″-⅜″) Xcelite 127-TB | 1 set |
| | Open end; 10 piece set; ¼″ through 1″; Thorsen PO-10 | 1 set |
| | Pipe; 14″, 2″ opening; Ridgid | 4 |
| | Pipe; 24″, 3″ opening; Ridgid | 2 |
| | Rim; 4 way; ¾″ × ¾″ × 13/16″ × ⅞″; Woody Auto - HD211 | 1 |
| | Socket set; ¼″ drive; 13 piece set; 3/16″ to ½″; complete with ratchet, extension, & steel case; S-K 4913 | 1 set |
| | Socket set; ⅜″ drive; 20 piece set; ⅜″ to ⅞″ in both std. and deep sockets and 6 & 12 points; complete with ratchet, extensions, and steel case; S-K 4520 | 1 set |
| | Socket set; ½″ drive; 16 piece set; 7/16″ to 1¼″ std. 12 pt. sockets; with ratchet, extension, flex handle, and steel box; S-K 4116 | 1 set |
| | Socket; metric; 14 piece set; 7 mm to 17 mm; with ratchet and extension; in a steel box; S-K 14 | 1 set |

| ITEM | DESCRIPTION EXAMPLES | QUANTITY |
|---|---|---|
| | Tappet; 4 piece set; 7/16" to ⅞"; Thorsen PT-4 | 1 set |
| | Torque; ½" drive; 0-150 ft/lb & 0-20/kg/m; Challenger 9709 | 1 |
| | Torque; ¾" drive; 0-600 in/lb & 0-50 ft/lbs; Williams 54221 | 1 |
| | Oil filter; Leslie 53500 | 2 |

## B. POWER TOOLS AND EQUIPMENT

| ITEM | DESCRIPTION EXAMPLES | QUANTITY |
|---|---|---|
| Air Compressor | Two stage; horizontal tank mounted; 100 psi max. pressure; minimum of 60 gal. tank capacity and 10 cfm displacement; complete with automatic pressure switch, safety valve, and pressure gauge; 2 HP, 230 v., 3-phase mostor with magnetic starter; Kellogg-American B321C0. | 1 |
| Battery Charger | 6/12 volt; positive alternator/polarity protection; 2-hour electric timer; 8' No. 4 charging cable; 15' 3-wire poewr cord for 120 v. 60 hz.; Marquette 32-135 | 1 |
| Circuit Interruptor | Groundfault; Portable; Hubbell 201 | 1 |
| Drills | Pistol grip; ¼" capacity; 1700 rpm, 3.7 amp, 120 v., 60 hz. motor with 3-wire power cord; Stanley 90053 | 5 |
| | Pistol grip; ¾" capacity; 0-1500 rpm reversible, speed control; 4 amp, 120 v., 60 hz. motor with 3-wire power cord; Stanley 91061 | 1 |
| | Spade handle; ½" capacity; 425 rpm, 4.3 amp, 120 v., 60 hz. motor with 3-wire power cord; Stanley 91722 | 1 |
| Drill Press | 15" capacity; variable speed (475-4700 rpm); floor model; tilting table; ½" Jacobs chuck; ¾ HP, 60 hz, 1725 rpm motor 3-phase, 230 v., with 24 v. push button magnetic control; Rockwell 15-467 | 1 |

| ITEM | DESCRIPTION EXAMPLES | QUANTITY |
|---|---|---|
| | 20″ capacity; variable speed (200-2000 rpm); floor model; production table; No. 3 M.T. spindle; 1½ HP, 60 hz., 1725 rpm motor—3-phase, 230 v. with 24 v. push button magnetic control; Rockwell 2000 | 1 |
| Electrical Teaching Cabinet | Cabinet with circuit breaker switch, groundfault interrupter and electrical kits 1, 2, 3, and 4 | |
| Engine | 4 cycle; horizontal shaft; 3.0 HP; air cooled; Briggs & Stratton 80302-0015 | 10 |
| | 2 cycle; vertical shaft; 3.0 HP; air cooled; Tecumseh 710277B | 1 |
| Grinder | Bench; 7″ × 1″ × ⅝″ wheels; ½ HP, single phase, 60 hz., 115/230 v., 3450 rpm motor complete with grounding type plug; unit to include safety shields, spark deflector tool rest; Baldor 730 7D | 4 |
| | Pedestal; 12″ × 2¼″ × 1¼″ wheels; 2 HP, 60 hz., 1725 rpm motor—3-phase, 220/440 v. with 24 v. push button magnetic control; unit to include spark deflector and tool rest; Baldor Grinder 1215 W and Pedestal GA20 | 1 |
| Jack | Hydralic; 3 ton capacity; 6″ lift; 3½″ screw extension; Walker 925 | 1 |
| Jointer | 6″ × ½″ capacity; 7″ × 48″ table; with both infeed and outfeed tables adjustable; right and left tilt fence to stop at 45°; 5000 rpm; equipped with 3 high speed steel knives; both front and back knife guard; ¼ HP, 3-phase, 230 v., 60 hz. motor with magnetic controls; complete with stand; Powermatic 1500010 | 1 |
| Parts Washer | Air agitated wth dual filtration system and fire door cover; 23¾″ × 19″ soaking tank; complete with parts basket and drying shelf; Kleer-Flo 70 | 1 |

| ITEM | DESCRIPTION EXAMPLES | QUANTITY |
|---|---|---|
| Planer | Single surface; 16″ × 6″; belt drive; 3 high-speed heat treated tool steel knives; equipped with quik-set table roll adjustment; 3 HP, 3-phase, 230 v. motor with magnetic control; Powermatic 160-B | 1 |
| Sander | Portable belt; dustless; 3″ × 24″ belt; 1500 rpm belt speed; 10.5 amp, 115 v., universal type motor; with grounding cord or double insulation; Rockwell 360 | 1 |
| | Portable orbital-finishing; 4½″ × 9⅜″ pad; 10,000 orbits/minute; 3 amp, 115 v., universal type motor; with grounding cord or double insulation; Rockwell 4485 | 1 |
| Saw | Bandsaw; combination wood and metal; capacity - 14″ blade to column and 6½″ under guide; 1725 rpm motor with adjustable 40, 60 100, 160, 750, 1200, 1899, & 3000 SFM blade speed; 15″ × 15″ slotted, tilting table - tilts to right and left; all moving parts guarded except operating portion of blade; equipped with brake; complete with following accessories:<br>blade welder & grinder<br>rip fence<br>miter gauge<br>work light<br>¼″ × 95″ wood cutting blade<br>⅜″ × 95″ wood cutting blade<br>¼″ × 95″ wood cutting blade<br>¼ hp, 3-phase, 230 v., motor with magnetic controls; Powermatic 143 | 1 |
| | Portable circular (SKIL); 7¼″ × ⅝″ blade; 5800 rpm., 11.5 amp., 115 v., 60 hz. motor with grounding plug; basic saw in a kit complete with 1 combination blade, blade wrench, rip guide and carrying case; Rockwell 315 | 1 |
| | Hacksaw; Marvel Drawcut #2 | 1 |

| ITEM | DESCRIPTION EXAMPLES | QUANTITY |
|---|---|---|
| | Sabre; 3600 strokes/minute; ⅝" stroke; max. cut 2¾"; 3.0 amp, 115 v., 60 hz., universal motor; with grounding plug or double insulation; basic saw in a kit complete with 8 assorted blades, rip guide, and carrying case; Stanley 90-076-5 | 1 |
| | Tilting arbor (table); 10" blade with ⅝" arbor; 3⅛" depth of cut; 36" × 27" table with T-slot mitre gauge groove; jet lock rip fence; front and rear guide bars; Table inserts for standard blade and dado head; miter gauge; set of 3 matched V-belts; equipped with swing type uniguard and anti-kickback fingers; complete with enclosed steel stand; 3450 rpm, 3 HP, 3-phase, 230 v. meter with magnetic controls; complete with following blades:<br>1 crosscut<br>1 rip cut<br>1 combination<br>1 6" dado head | |
| | Rockwell Delta 10 | 1 |
| Shear | Lever; capacity in mild steel 4" × ¼"; 4½" cutting blades; 6' long carbon steel handle; fitted with adjustable cut-off gauge; Pexto 0325 | 1 |
| Welder | Arc; 225 amp, AC, 60 hz., single phase; 20% duty cycle; primary volts 230; max. open circuit volts 79; primary circuit amps 40; with power factor condensors; complete with 6' No. 12 power cord with 3-prong plug and receptacle, 10' No. 4 ground cable with clamp, 15' No. 4 electrode cable with insulated electrode holder, and running gear; Lincoln 225-S | 8 |
| | Arc; 300 amp AC/Dc, 60 hz., single phase; primary volts 230/460; max. open circuit volts 40; primary circuit amps 90; 60% duty cycle; with power factor correction; complete with 10' No. 4 power cord with plug and receptacle, 35' No. 2 elec- | |

| ITEM | DESCRIPTION EXAMPLES | QUANTITY |
|---|---|---|
| | trode cable with insulated electrode holder, 30′ No. 2 ground cable with ground clamp, and running gear with handle; Idealarc Lincoln TM 300/900 | 1 |
| | Oxygen-acetylene outfit; two-stage acetylene regulator; two-stage oxygen regulator; welding torch with mixer; cutting attachment; welding tips No. MW 203, MW 205, MW 209; No. 2 cutting tip; sparklighter; welding goggles; six-way wrench; 20′ of 3/16″ twin neoprene hose with connections; 4 on mainfold system, 1 portable, Smith, Big 98 | 5 |
| | Cylinder Truck for standard cylinders; 16″ semi pneumatic rubber tire wheels; tool tray; safety chain; Airco 815-2616 | 1 |
| Welding Accessories | Helmet; lift-front lens retainer with 2″ × 4½″ No. 10 shade lens; Sellstrom 233RS | 15 |
| | Chipping hammer; combination hammer and cleaning brush; replaceable brush; Nasco 6320091-Awl | 15 |
| | Apron; bib type; asbestos; 24″ W × 36″ L; Steiner - 15026 | 15 |
| | Demonstration screen; No. 10 shade,plastic; 20″ × 50″; Lincoln WC-27 | 1 |
| | Carbon arc torch; complete with 10′ cables, two sets of ⅛″ carbons, two sets of ¼″ carbons, and ¼″ carbon adaptors; Marquette-15-100 | 2 |
| | Welding cable extension; No. 6 conductor × 25′; Marquette-15-410 | 1 |
| | Goggles; No. 5 shade lens; Marquette 51-100 | |
| | Goggles; No. 5 shade lens; 2″ × 4½″; fits over prescription glasses; Sellstrom-65CPvA-S | 2 |
| | Torch lighters; round file type; Surelite #[illegible] | 10 |

| ITEM | DESCRIPTION EXAMPLES | QUANTITY |
|---|---|---|
| | Tip cleaners; 12 tips in a protective case; WYCO | 5 |
| | Cutting Tips; Nos. Mc12-00, MC12-0, MC12-1, MC12-2; Smith MC12 Series | 4 each |
| | Welding tips; Nos. MW205, MW208, MW209, MW210; Smith MW200 Series | 4 each |

# CRITERIA FOR QUALITY VOCATIONAL PROGRAMS IN AGRICULTURAL EDUCATION

## CRITERIA COMMON TO ALL PROGRAMS

### Instructional Program

| | EXCEEDS STANDARDS | MEETS STANDARDS | DOES NOT MEET STANDARDS |
|---|---|---|---|
| 1. The department's annual and five-year program plans, including goals, objectives, and activities, are on file in the department and with the administration.<br>*Observations and Recommendations: | | | |
| 2. A written statement of philosophy for vocational education in agriculture is on file and is in harmony with the philosophy statement for the total school.<br>*Observations and Recommendations: | | | |
| 3. The instructional program is reviewed and modified in light of local, state, and federal manpower data.<br>*Observations and Recommendations: | | | |
| 4. Validated competencies, needed by students for entry and advancement in employment, are utilized in developing objectives for the instructional program.<br>*Observations and Recommendations: | | | |
| 5. The instructional program contains the necessary balance of class time, laboratory work, field trips, and occupational experience to adequately prepare students for employment or advanced educational programs.<br>*Observations and Recommendations: | | | |
| 6. Students enrolled in vocational education in agriculture are also enrolled in other appropriate courses including science, mathematics, social science, and oral and written communications.<br>*Observations and Recommendations: | | | |
| 7. The instructional program is articulated with other local secondary, postsecondary, and four-year programs of education in agriculture.<br>*Observations and Recommendations: | | | |

| | EXCEEDS STANDARDS | MEETS STANDARDS | DOES NOT MEET STANDARDS |
|---|---|---|---|
| 8. Planned visits are made to prospective employers by the agriculture instructor or school placement officer to determine current manpower needs.<br>*Observations and Recommendations: | | | |
| 9. Written courses of study and teaching calendars are based on validated competencies and are evaluated and revised annually.<br>*Observations and Recommendations: | | | |
| 10. Provisions are made to accommodate students with physical handicaps or other special educational needs.<br>*Observations and Recommendations: | | | |
| 11. Community resources, facilities, and industries are identified and utilized to enhance the quality of the instructional program.<br>*Observations and Recommendations: | | | |
| 12. Lesson plans are developed that clearly state instructional objectives, activities, and resources to be utilized during instruction.<br>*Observations and Recommendations: | | | |
| 13. Modern and technically accurate instructional materials and reference books are utilized in the instructional program.<br>*Observations and Recommendations: | | | |
| 14. Students have access to current agricultural publications.<br>*Observations and Recommendations: | | | |
| 15. Instruction in safety is provided in advance of any laboratory work.<br>*Observations and Recommendations: | | | |

| | EXCEEDS STANDARDS | MEETS STANDARDS | DOES NOT MEET STANDARDS |
|---|---|---|---|
| 16. Transportation is provided to students for all planned off-campus educational activities.<br>*Observations and Recommendations: | | | |
| **Supervised Occupational Experience**<br>17. Students are engaged in supervised occupational experienced programs that are related to their occupational objective and are appropriate in light of their ability and place of residence.<br>*Observations and Recommendations: | | | |
| 18. A systematic plan is utilized to select, develop, and evaluate training stations that assist students in obtaining desired occupational competencies.<br>*Observations and Recommendations: | | | |
| 19. The instructor, student, and employer cooperatively develop a formal training agreement and training plan which include essential competencies and experiences that are to be acquired during the program.<br>*Observations and Recommendations: | | | |
| 20. Students who are employed and participating in the occupational experience program are employed in accordance with all applicable federal and state laws.<br>*Observations and Recommendations: | | | |
| 21. The instructor provides effective coordination, supervision, and occupational guidance to students engaged in occupational experience programs.<br>*Observations and Recommendations: | | | |

| | EXCEEDS STANDARDS | MEETS STANDARDS | DOES NOT MEET STANDARDS |
|---|---|---|---|
| 22. Supervision of students, engaged in cooperative occupational experience programs, is accomplished by both the instructor and the cooperating employer.<br>*Observations and Recommendations: | | | |
| 23. Agriculture instructors have at least one class preparation period and one period for supervision per instructional day.<br>*Observations and Recommendations: | | | |
| 24. Each instructor responsible for supervision of occupational experience programs maintains adequate records to determine student progress and to assist in placement.<br>*Observations and Recommendations: | | | |
| 25. Each student engaged in a supervised occupational experience program maintains accurate and up-to-date records including financial transactions and competencies acquired during the program.<br>*Observations and Recommendations: | | | |
| 26. Students receive (school) credit for all supervised occupational employment programs that are conducted during regular school hours.<br>*Observations and Recommendations: | | | |
| 27. A minimum of one on-site supervisory visit per month is made by the instructor to each employer and student enrolled in a cooperative educational training program.<br>*Observations and Recommendations: | | | |
| 28. A minimum of four (4) supervisory visits will be made to each student enrolled in agricultural education.<br>*Observations and Recommendations: | | | |

| | EXCEEDS STANDARDS | MEETS STANDARDS | DOES NOT MEET STANDARDS |
|---|---|---|---|
| **Leadership Development** | | | |
| 29. All secondary agriculture students are members and participate in the Future Farmers of America (FFA).<br>*Observations and Recommendations: | | | |
| 30. All agriculture students who are enrolled in young farmer instructional programs are members and participate in the Young Farmers of Virginia (YFV).<br>*Observations and Recommendations: | | | |
| 31. The local FFA Chapter and YFV involve members in activities at the district, state, and national levels.<br>*Observations and Recommendations: | | | |
| 32. Leadership development activities are an integral part of the instructional program.<br>*Observations and Recommendations: | | | |
| **Student Recruitment, Enrollment and Counseling** | | | |
| 33. Students enrolling in an option of agriculture should have completed a two-year basic vocational agriculture program.<br>*Observations and Recommendations: | | | |
| 34. Propective students and their parents are visited by the agriculture instructor and provided copies of the program objectives prior to their enrollment in the program.<br>*Observations and Recommendations: | | | |
| 35. A student file is maintained for all students and contains current information such as occupational objectives, supervised occupational experience programs, FFA activities and course work.<br>*Observations and Recommendations: | | | |

| | EXCEEDS STANDARDS | MEETS STANDARDS | DOES NOT MEET STANDARDS |
|---|---|---|---|
| 36. The agriculture instructor advises each student on a regular basis and assists those with special educational and personal needs to obtain additional assistance from qualified school personnel.<br>*Observations and Recommendations: | | | |
| **Public Relations**<br>37. Through an effective public relations program the faculty, students, parents, employers, advisory council members, and the community understand the educational objectives, major objectives and accomplishments of the agriculture program.<br>*Observations and Recommendations: | | | |
| 38. The instructors establish and maintain cooperative working relations with leaders in related industries, organizations, and agencies.<br>*Observations and Recommendations: | | | |
| **Facilities and Equipment**<br>39. The classrooms and laboratories are adequate for the number of students enrolled. The equipment is appropriate for that found in the occupations for which training is provided.<br>*Observations and Recommendations: | | | |
| 40. Facilities and equipment meet all current state and federal safety regulations.<br>*Observations and Recommendations: | | | |
| 41. Classrooms and laboratories are maintained in an orderly, safe, and attractive condition.<br>*Observations and Recommendations: | | | |
| 42. Facilities and equipment are arranged with consideration given to effective teaching, class control, safety, and economy.<br>*Observations and Recommendations: | | | |

| | EXCEEDS STANDARDS | MEETS STANDARDS | DOES NOT MEET STANDARDS |
|---|---|---|---|
| 43. A land laboratory, convenient to the school, is provided and utilized in the instructional program.<br>*Observations and Recommendations: | | | |
| 44. The departmental office is located so as to provide optimum supervision.<br>*Observations and Recommendations: | | | |
| 45. Supplies and equipment are stored in a systematic and safe manner.<br>*Observations and Recommendations: | | | |
| 46. Maintenance and service records of equipment are on file in the department office.<br>*Observations and Recommendations: | | | |
| 47. Facilities are designed to meet or exceed the recommendations of the Virginia Department of Education. The teachers of agricultural education in the school district are involved in planning the facilities.<br>*Observations and Recommendations: | | | |
| **Staffing** | | | |
| 48. The instructor possesses the personal, technical, professional, and occupational competencies necessary to prepare students for entry-level employment or for advanced educational programs.<br>*Observations and Recommendations: | | | |
| 49. The instructor is sensitive to the needs of students and can recognize and make provisions for individual student differences within the instructional program.<br>*Observations and Recommendations: | | | |

| | EXCEEDS STANDARDS | MEETS STANDARDS | DOES NOT MEET STANDARDS |
|---|---|---|---|
| 50. Instructors are employed on twelve-month contracts to provide for continuous education and supervision of students during summer months.<br>*Observations and Recommendations: | | | |
| 51. The maximum assignment per instructor is 20 hours of classroom instructional time, five hours of student advising, and fifteen hours of supervision and preparation per week.<br>*Observations and Recommendations: | | | |
| 52. The instructor is actively involved in professional teacher organizations which are supported by agricultural educators in the state, and is engaged in continuing in-service professional development programs.<br>*Observations and Recommendations: | | | |
| 53. At least one instructor in the department holds a current Red Cross first aid card or its equivalent.<br>*Observations and Recommendations: | | | |
| 54. The department has access to adequate secretarial services.<br>*Observations and Recommendations: | | | |
| 55. Instructors holding collegiate certification will acquire full collegiate professional certification within three years of original employment.<br>*Observations and Recommendations: | | | |
| **Administration and Supervision**<br>56. The agriculture program is an integral part of the local school division plan for vocational education.<br>*Observations and Recommendations: | | | |

| | EXCEEDS STANDARDS | MEETS STANDARDS | DOES NOT MEET STANDARDS |
|---|---|---|---|
| 57. The instructor participates in a minimum of four weeks of professional improvement activities every three years.<br>*Observations and Recommendations: | | | |
| 58. Representatives of local, area, and state education agencies participate in planning the program of instruction and are kept informed of the progress made.<br>*Observations and Recommendations: | | | |
| 59. In multiple-instructor departments, one instructor is appointed and compensated to serve as department head. Job descriptions are on file for all department staff members.<br>*Observations and Recommendations: | | | |
| 60. An agriculture advisory council or committee is formed and meets at least twice a year to help determine program needs and to assist in promotion, and evaluation of the program.<br>*Observations and Recommendations: | | | |
| 61. The advisory council functions under written guidelines which specify the length of a member's term, responsibilities, and operational procedures.<br>*Observations and Recommendations: | | | |
| 62. An advisory committee for the total agricultural education program is active. Members of the advisory committee serve as advisory committee to specialized program in agricultural education.<br>*Observations and Recommendations: | | | |

| | EXCEEDS STANDARDS | MEETS STANDARDS | DOES NOT MEET STANDARDS |
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| **Finance**<br>63. The instructional program is supported by an annual board-approved budget that considers program needs and the number of students enrolled. Included are:<br>a. Staff compensation on year-round basis<br>b. Staff compensation for program of continuing education<br>c. Facility operation and maintenance<br>d. Equipment and material purchase and replacement<br>e. Consumable supplies<br>f. Teacher travel and per diem<br>g. Transportation for field trips<br>h. In-service education<br>*Observations and Recommendations: | | | |
| 64. Appropriate and accurate financial records are maintained. Administration and/or board-approved policies are provided for the receipt and disbursement of funds.<br>*Observations and Recommendations: | | | |
| 65. Appropriate and accurate financial records are maintained. Administration and/or board-approved policies are provided for the receipt and disbursement of funds.<br>*Observations and Recommendations: | | | |
| **Placement**<br>66. The instructor, in cooperation with the school counselor, assists in the placement and follow-up of students. A file of placement and employment records is maintained.<br>*Observations and Recommendations: | | | |
| **Evaluation**<br>67. The instructor, local administrator(s), and appropriate state education agency staff member(s) meet at regular intervals to formally examine and evaluate the agriculture program using these standards in connection with the annual self-evaluation.<br>*Observations and Recommendations: | | | |

| | EXCEEDS STANDARDS | MEETS STANDARDS | DOES NOT MEET STANDARDS |
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| 68. One and five year follow-up surveys of former students are made to determine their current occupational or educational status.<br>*Observations and Recommendations: | | | |
| 69. Results obtained from program evaluations are used to promote, develop, and improve the instructional program.<br>*Observations and Recommendations: | | | |

**Adult Education in Agriculture**

CRITERIA COMMON TO ADULT EDUCATION ARE LISTED UNDER THE SEPARATE HEADING OF "ADULT EDUCATION IN AGRICULTURE."

## CRITERIA SPECIFIC TO AGRICULTURAL SCIENCE AND MECHANICS I AND II

| | EXCEEDS STANDARDS | MEETS STANDARDS | DOES NOT MEET STANDARDS |
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| **Instructional Program** | | | |
| 1. Class size is limited to a maximum of 20 students. For students with special needs, the limit is 15 per class. | | | |
| 2. A minimum of 275 minutes of net class time per week is provided. | | | |
| 3. Instructors submit to the administration a carefully planned program of responsibilities to be assumed during the summer months. | | | |
| **Supervised Occupational Experience** | | | |
| 4. The instructional program provides a minimum of four on-site supervisory visits per student during a 12-month period. | | | |
| 5. The instructor schedules a minimum of eight hours per week for occupational experience supervision. | | | |
| 6. An annual report of the occupational experience program of students is submitted to the school administration and state educational agency staff. | | | |
| **Staffing** | | | |
| 7. Instructors certified to teach Agricultural Science & Mechanics I & II have preparation in agricultural economics and business analysis, animal science, plant and soil science, agricultural mechanics, and leadership development. They have had two or more years of farm experience or equivalent occupational experience. | | | |
| **Administration and Supervision** | | | |
| 8. The maximum student-teacher ratio is 60 to 1. | | | |
| 9. Students receive a minimum of one semester credit per hour of [illegible]ity instruction. | | | |

## LIST OF AGRICULTURAL EDUCATION PUBLICATIONS

Agricultural Education in Virginia's Public Schools

A Planning Guide for Agricultural Education Programs in Virginia's Public Schools

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